ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 221	1/4
ZEXEL No.	:	101695-3202	
Date	:	31.10.1992	[3]
Company	:	KOMATSU	
Engine	:	S6D95L / 6207-71-1451	

IP-Type number	:	101069-9430 / PES6A
Governor type number	:	105400-8040 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	2.00 x 6.00 x 600

PORT CLOSING

Prestroke mm	:	3.6 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

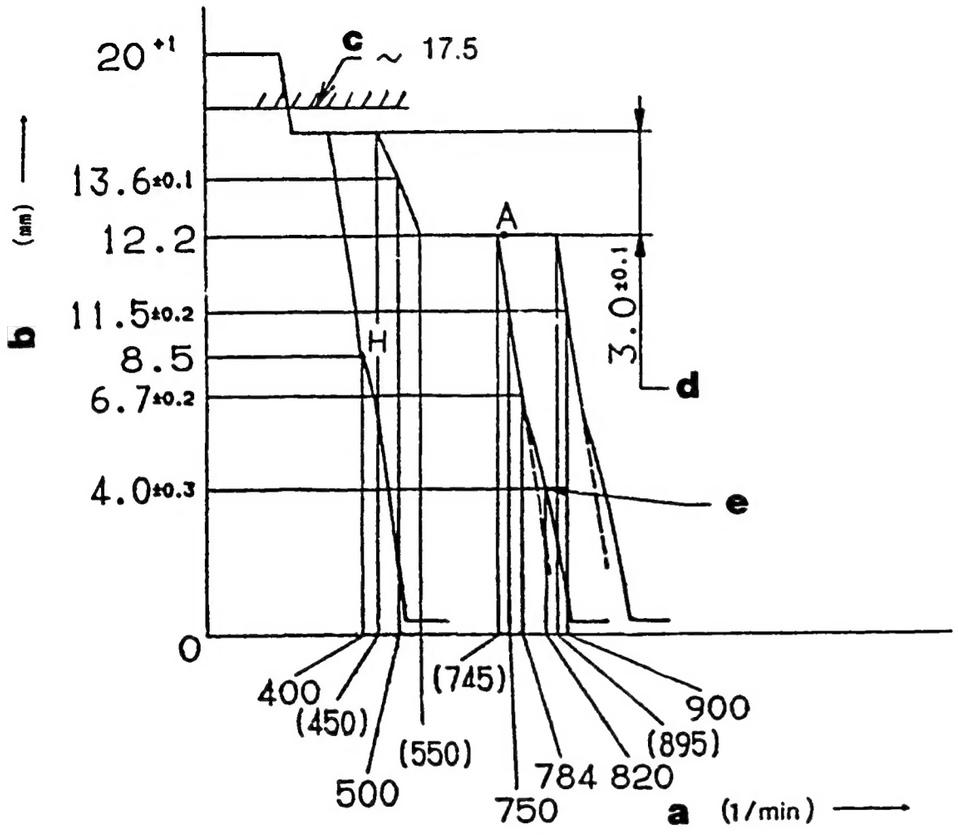
Continued (Test values)

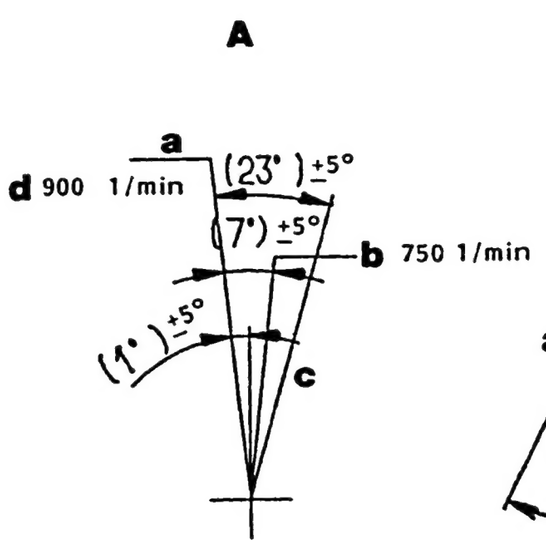
Injection Quantity :

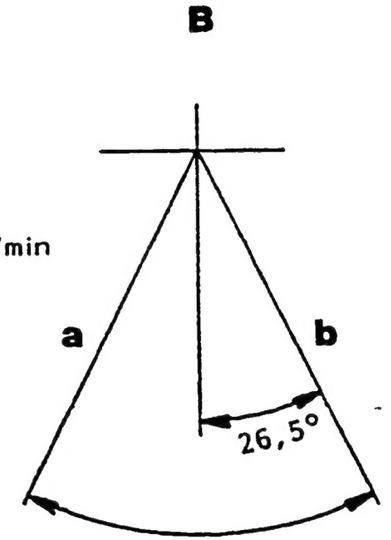
Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	12.2	750	62.7 ± 1.0	± 2.5	Rack	Basic
	approx.10.0	400	12.5 ± 1.0	± 15.0	Rack	
A	12.2	750	62.7 ± 1.0	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)						
Advance Angle (deg)						







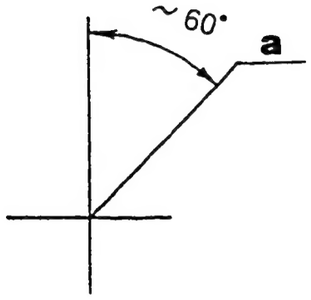


Figure 75

a = Pump speed
b = Control rack position
c = Control rack limit:
d = Difference in control rack position between 750 rpm and 400 rpm
e = Idle-sub spring setting:

GOVERNOR ADJUSTMENT

101695-3202 2/4

Recommended speed droop adjustment screw position: 12

A = Speed Control Lever Angle
a = Full-speed
b = Setting:
c = Idling
d = Setting:
(on our shipment)

B = STOP LEVER ANGLE
a = Stop
b = Normal

TIMING SETTING

At No. 1 plunger's beginning of injection position.

a = Key position

■ Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

		Pump Speed (rpm)	Rack Position (mm)	Boost pressure kPa (mmHg)	Remarks
Full-load Adjustment (Temporary)		1100 600	12.2 12.2	-	• Adjust using screw (2) • Adjust using screw (1)
Torque Control Spring Adjustment	**1.st stroke**	approx. 350 500 approx. 500	15.2 13.6 12.2	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: 3.0 ± 0.1 mm
	2.st stroke	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Maximum-speed Adjustment		750 784 900	12.2 6.7 10.5 ± 0.2	-	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Boost Compensator System		-	-	-	• Fix the control lever • Adjust using screw (6) • Confirm the boost compensator stroke is: (mm)
Idling Adjustment 1. Idling Sub Spring		820	4.0 ± 0.3	-	• Fix the control lever • Adjust using spring capsule (5) • Confirm
2. Control Lever	**H**	400	8.5	-	• Adjust using the control lever
Full-load Adjustment		750	12.2	-	• Adjust using screw (1)
Control Lever Angle Measurement		• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.			
Control Rack Limiter Adjustment		0	approx. 17.5	-	• Adjust using screw

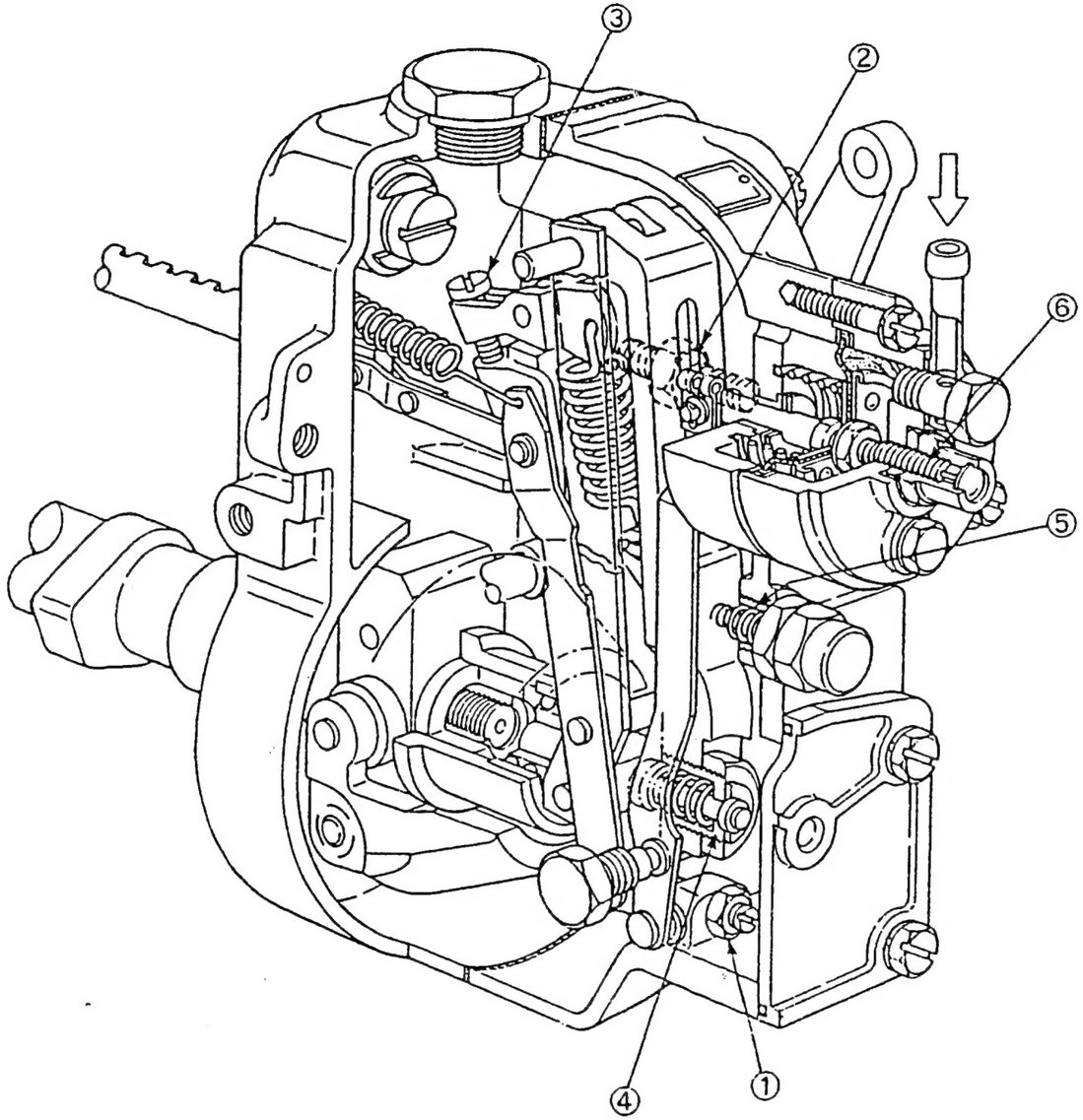


Figure 76
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule
6 = Screw

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	: 9 400 610 222	1/4
ZEXEL No.	: 101695-3580	
Date	: 31.10.1992	[0]
Company	: KOMATSU	
Engine	: 6D95L / 6206-71-1460	

IP-Type number : 101069-9141 / PES6A
Governor type number : 105400-7460 / EP/RSV

TEST PREREQUISITES

Test oil : ISO-4113
Test oil inlet temperature °C : 40.00...45.00
Inlet pressure bar : 1.6
Test nozzle holder combination : 1 688 901 013
Opening pressure bar : 175
Test pressure line
Inner x Outer Dia - Length mm : 2.00 x 6.00 x 600

PORT CLOSING

Prestroke mm : 3.6 ± 0.05
Rod position mm : -
Port closing mark Cyl. No. : -
Cam sequence : 1-5-3-6-2-4

Port closing mark Cyl. No. : -
Port closing difference °NW : 0-60-120-180-240-300

Tolerance +- °C: 0.50 (0.75)

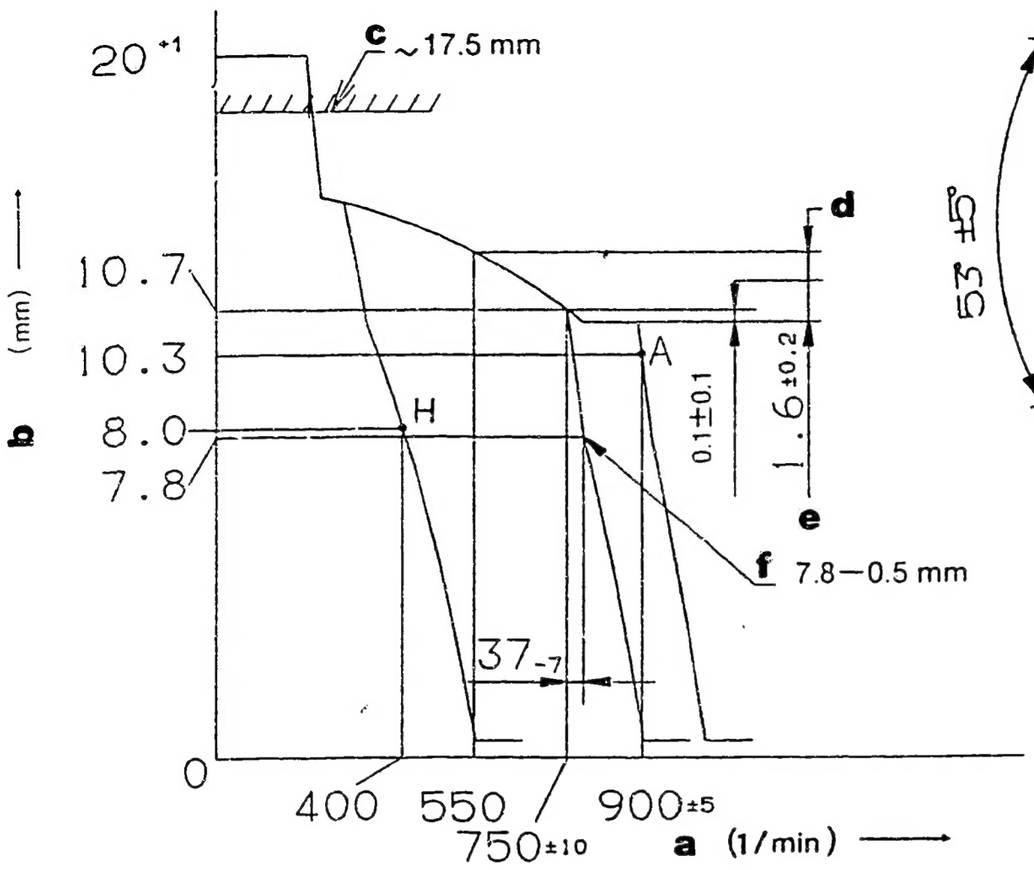
Continued (Test values)

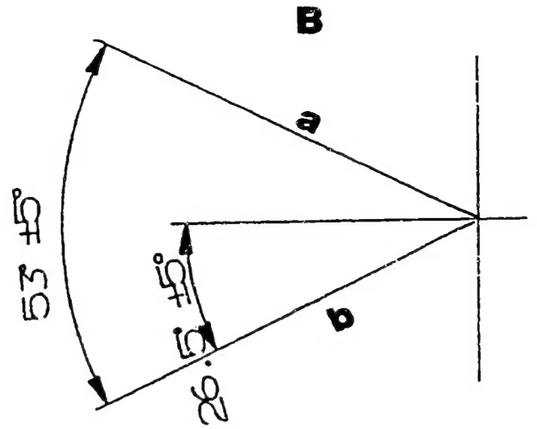
Injection Quantity :

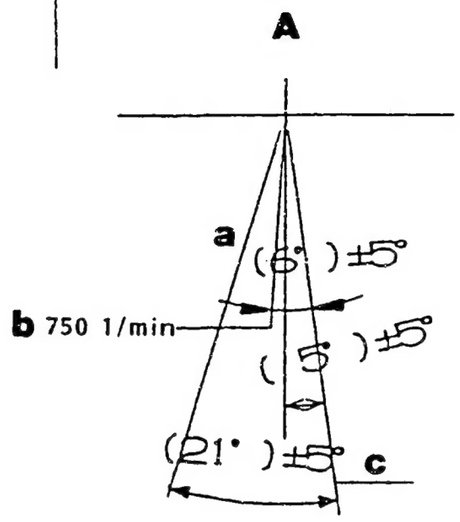
Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	10.3	900	52.0 ± 1.0	± 2.5	Rack	Basic
	approx. 9.1	400	10.5 ± 1.0	± 15.0	Rack	
A	10.3	900	52.0 ± 1.0	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)						
Advance Angle (deg)						







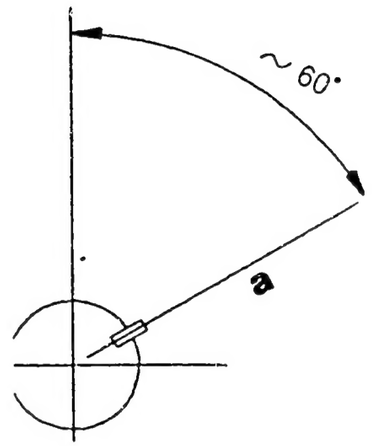


Figure 77

a = Pump speed
b = Control rack position
c = Control rack limit:
d = Difference in control rack position between 800 rpm and 550 rpm
e = Difference in control rack position between 800 rpm and 750 rpm
f = Idle-sub spring setting:

GOVERNOR ADJUSTMENT

Recommended speed droop adjustment screw position: 8

A = Speed Control Lever Angle
a = Idling
b = Setting:
c = Full-speed

B = STOP LEVER ANGLE
a = Stop
b = Normal

■ TIMING SETTING

At No. 1 plunger's beginning of injection position.

a = Camshaft key groove position

■ Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

		Pump Speed (rpm)	Rack Position (mm)	Boost pressure kPa (mmHg)	Remarks
Full-load Adjustment (Temporary)		1100 600	10.3 10.6	-	• Adjust using screw (2) • Adjust using screw (1)
Torque Control Spring Adjustment	**1.st stroke**	550 750 ± 10	12.2 10.7	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
	2.st stroke	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Maximum-speed Adjustment		750 ± 10 750+37 +30	10.7 7.8	-	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Boost Compensator System		-	-	-	• Fix the control lever • Adjust using screw (6) • Confirm the boost compensator stroke is: (mm)
Idling Adjustment 1. Idling Sub Spring		750+37 +30	7.8 -0.5	-	• Fix the control lever • Adjust using spring capsule (5) • Confirm
2. Control Lever	**H**	400	8.0	-	• Adjust using the control lever
Full-load Adjustment		850	10.6	-	• Confirm
Control Lever Angle Measurement		• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.			
Control Rack Limiter Adjustment		0	approx. 17.5	-	• Adjust using screw

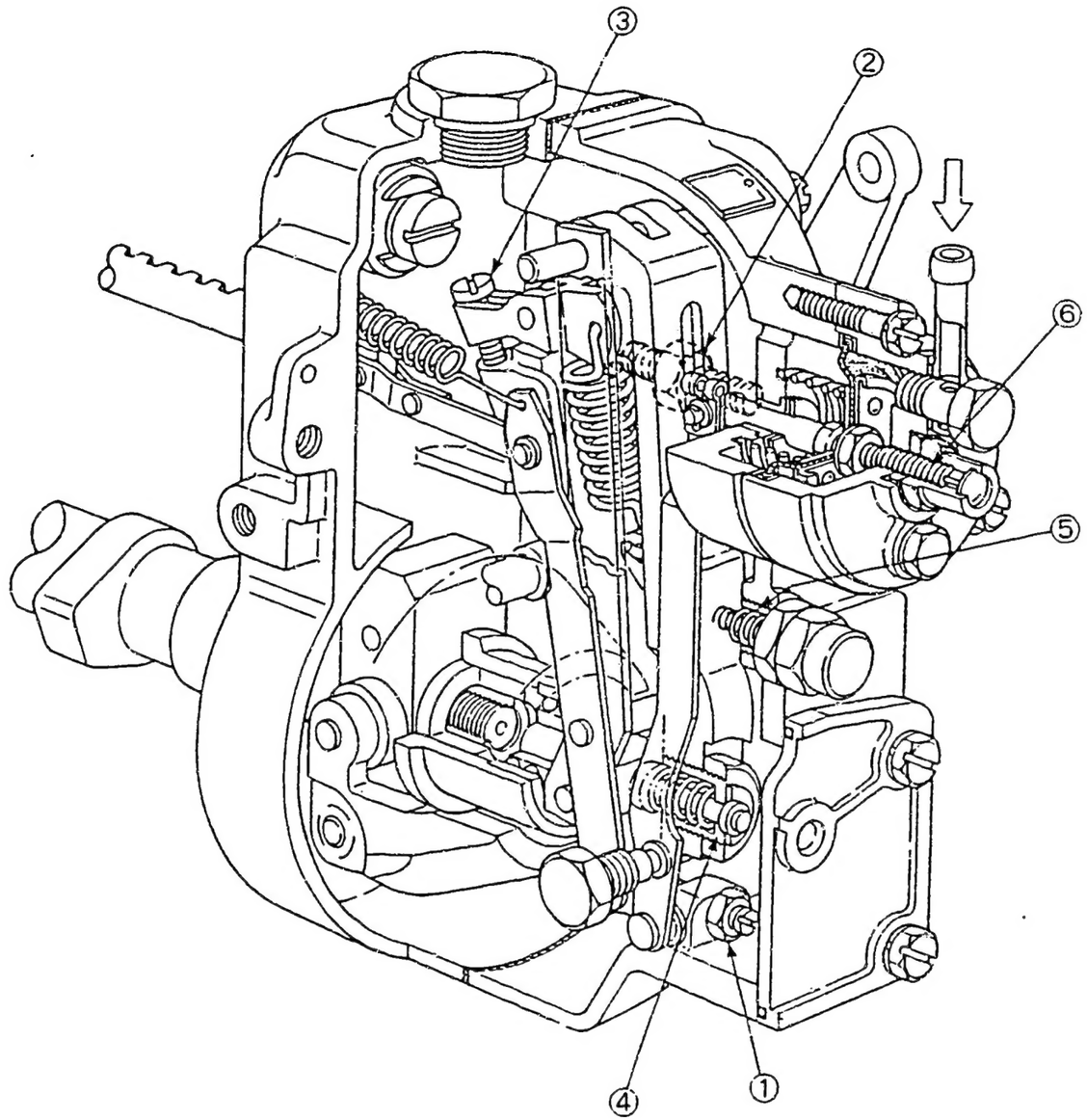


Figure 78
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule
6 = Screw

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 223	1/4
ZEXEL No.	:	103662-2292	
Date	:	31.10.1992	[6]
Company	:	KOMATSU	
Engine	:	SA6D170A / 6162-73-1332	

IP-Type number	:	103066-3760 / PE6ZW
Governor type number	:	105445-0521 / EP/RSUV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	0 681 343 002
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	4.00 x 8.00 x 1500

PORT CLOSING

Prestroke mm	:	3.8 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

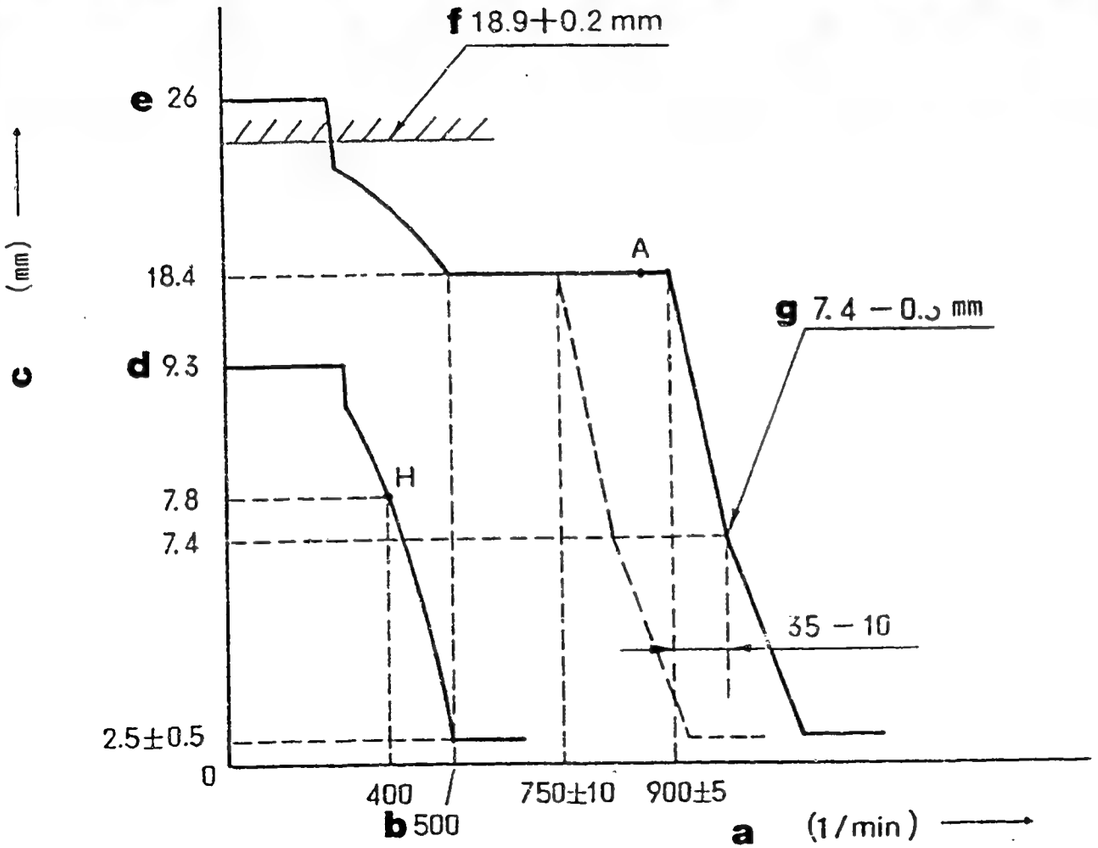
Continued (Test values)

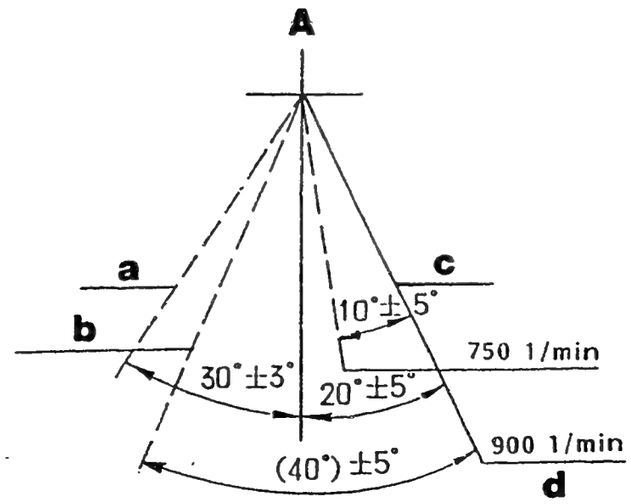
Injection Quantity :

Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	18.4	875	584 ± 5	± 4.0	Rack	Basic
H	approx. 7.8	400	75.7 ± 5	± 14.0	Rack	
A	18.4	875	584 ± 5	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)						
Advance Angle (deg)						





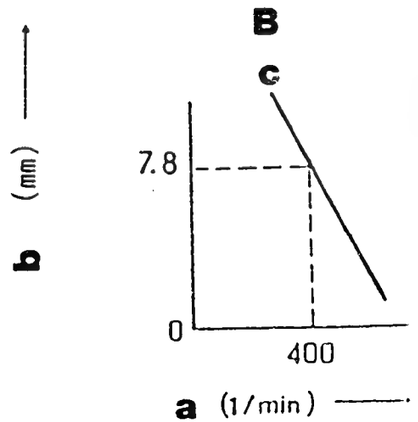


Figure 79

GOVERNOR ADJUSTMENT 103662-2292 2/4
Recommended speed droop adjustment screw position: 10

Minimum-Maximum Speed Specification
a = Pump speed
b = Above
c = Control rack position
d = Above
e = Above
f = Control rack limit:
g = Idle-sub spring setting:

A = Speed Control Lever Angle

a = Stop
b = Idling
c = Full-speed
d = (On our shipment)

B = Variable Speed Specification

a = Pump speed
b = Control rack position
c = Idle setting

■ Note
- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

		Pump Speed (rpm)	Rack Position (mm)	Boost pressure kPa (mmHg)	Remarks
Full-load Adjustment (Temporary)		1100 600	18.4 18.4	-	• Adjust using screw (2) • Adjust using screw (1)
Torque Control Spring Adjustment	**1.st stroke**	above 500	18.4	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
	2.st stroke	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Maximum-speed Adjustment		900 ± 5 900+35 +25	18.4 7.4	-	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Boost Compensator System		-	-	-	• Fix the control lever • Adjust using screw (6) • Confirm the boost compensator stroke is: (mm)
Idling Adjustment 1. Idling Sub Spring		900 ± 5 900+35 +25	7.4	-	• Fix the control lever • Adjust using spring capsule (5) • Confirm
2. Control Lever	**H**	0 400 above 500	above 9.3 7.8 2.5 ± 0.5	-	• Adjust using the control lever • Confirm
Full-load Adjustment		875	18.4	-	• Confirm
Control Lever Angle Measurement		• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.			
Control Rack Limiter Adjustment		0	18.9 + 0.2	-	• Adjust using screw

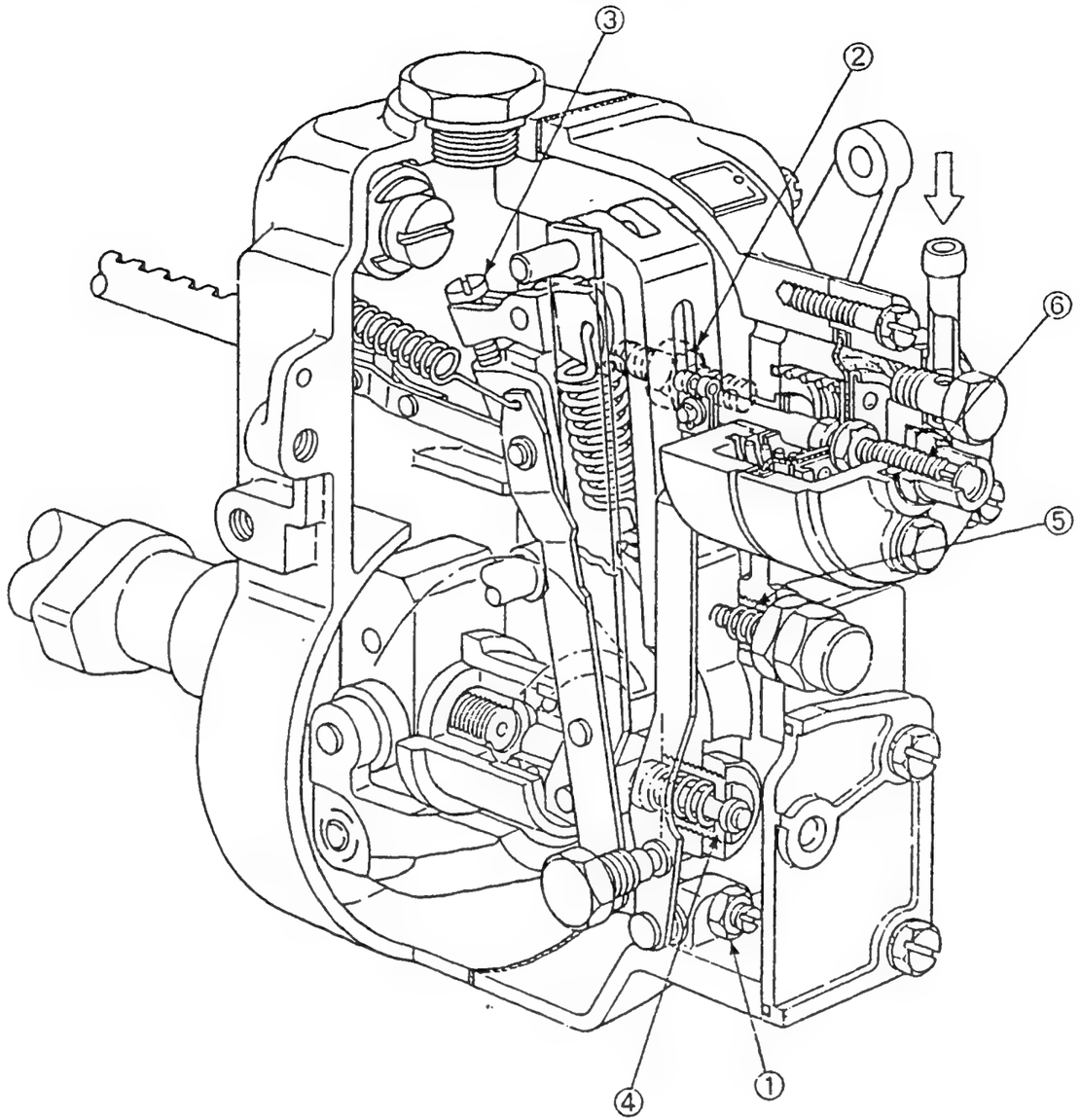


Figure 80
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule
6 = Screw

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	: 9 400 610 224	1/4
ZEXEL No.	: 103662-3051	
Date	: 31.10.1992	[6]
Company	: KOMATSU	
Engine	: SA6D170A / 6162-73-1334	

IP-Type number : 103066-3900 / PE6ZW
Governor type number : 105445-0791 / EP/RSUV

TEST PREREQUISITES

Test oil : ISO-4113
Test oil inlet temperature °C : 40.00...45.00
Inlet pressure bar : 1.6
Test nozzle holder combination : 0 681 343 002
Opening pressure bar : 175
Test pressure line
Inner x Outer Dia - Length mm : 4.00 x 8.00 x 1500

PORT CLOSING

Prestroke mm : 3.8 ± 0.05
Rod position mm : -
Port closing mark Cyl. No. : -
Cam sequence : 1-5-3-6-2-4

Port closing mark Cyl. No. : -
Port closing difference °NW : 0-60-120-180-240-300

Tolerance +- °C: 0.50 (0.75)

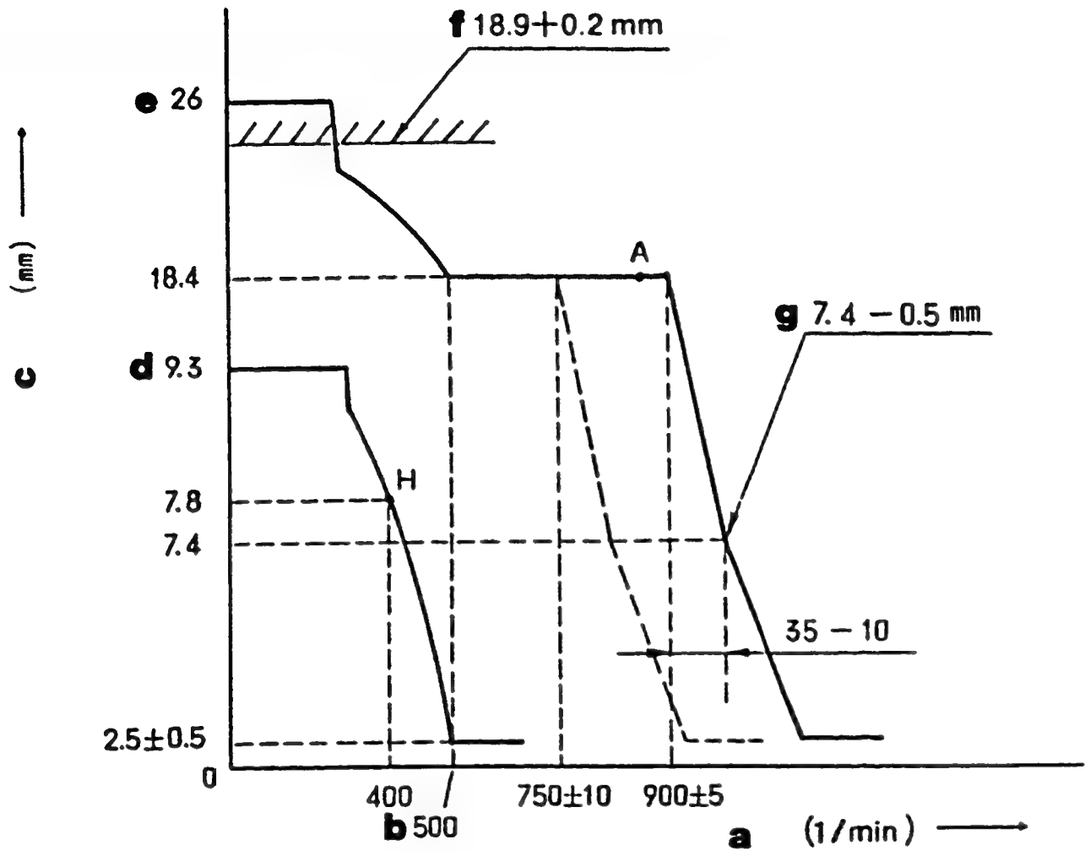
Continued (Test values)

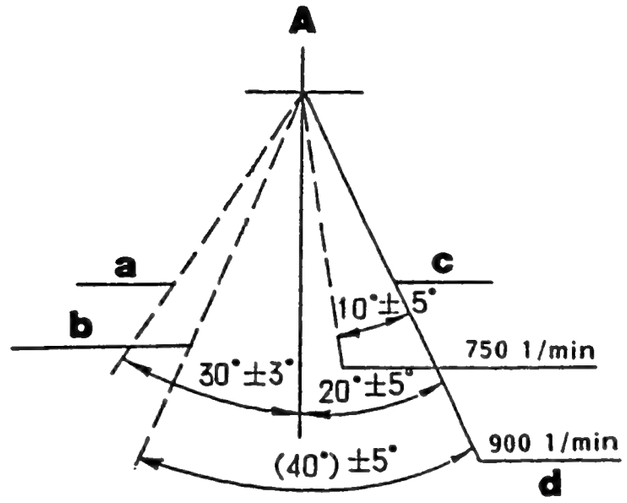
Injection Quantity :

Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm³/1000 str.)	Difference (%)	Fixed	Remarks
A	18.4	875	584.0 ± 5.0	± 4.0	Lever	Basic
H	approx. 7.8	400	75.7 ± 5.0	± 14.0	Rack	
A	18.4	875	584.0 ± 5.0	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)						
Advance Angle (deg)						





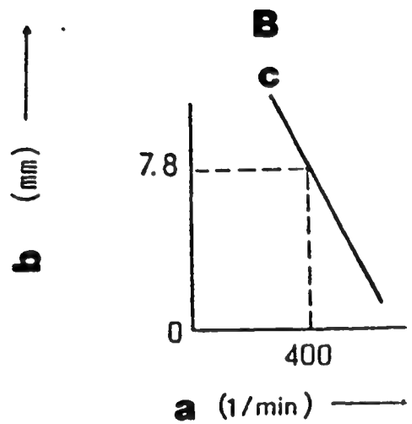


Figure 81

GOVERNOR ADJUSTMENT 103662-3051 2/4
Recommended speed droop adjustment screw position: 10

Minimum-Maximum Speed Specification
a = Pump speed
b = Above
c = Control rack position
d = Above
e = Above
f = Control rack limit:
g = Idle-sub spring setting:

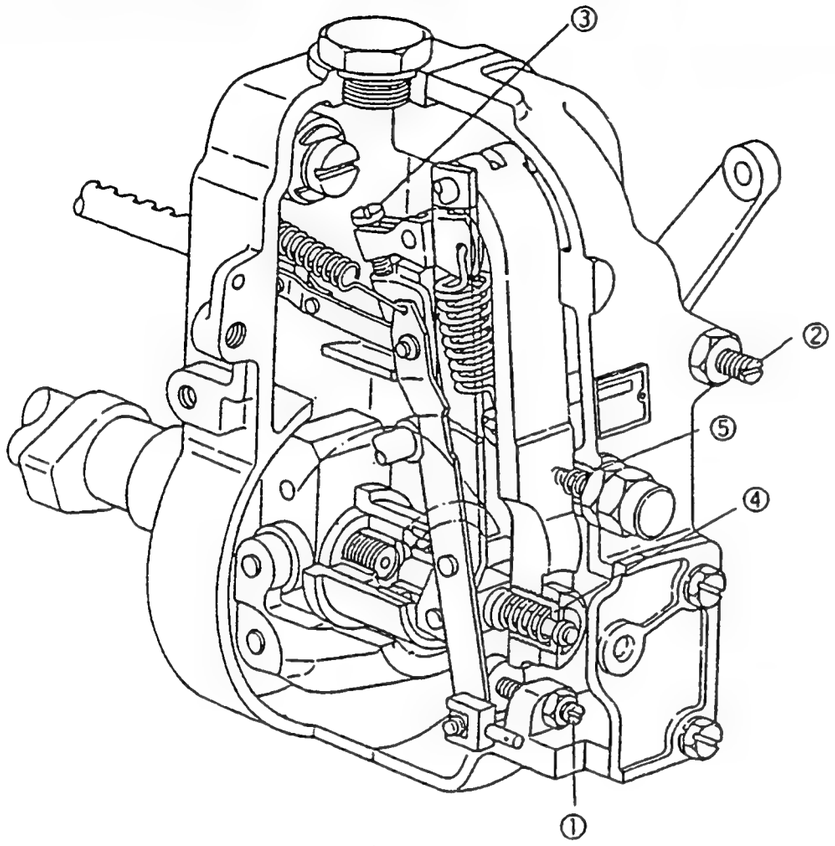
A = Speed Control Lever Angle

a = Stop
b = Idling
c = Full-speed
d = (on our shipment)

B = Variable Speed Specification

a = Pump speed
b = Control rack position
c = Idle setting

		Pump Speed (rpm)	Rack Position (mm)	Boost pressure kPa (mmHg)	Remarks
Full-load Adjustment (Temporary)		1100 600	18.4 18.4	-	• Adjust using screw (2) • Adjust using screw (1)
Torque Control Spring Adjustment	**1.st stroke**	above 500	18.4	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
	2.st stroke	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Maximum-speed Adjustment		900 ± 5 900+35 +25	18.4 7.4	-	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Boost Compensator System		-	-	-	• Fix the control lever • Adjust using screw (6) • Confirm the boost compensator stroke is: (mm)
Idling Adjustment 1. Idling Sub Spring		900+35 +25	7.4	-	• Fix the control lever • Adjust using spring capsule (5) • Confirm
2. Control Lever	**H**	0 400 above 500	above 9.3 7.8 2.5 ± 0.5	-	• Adjust using the control lever • Confirm
Full-load Adjustment		875	18.4	-	• Confirm
Control Lever Angle Measurement		• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.			
Control Rack Limiter Adjustment		0	18.9 + 0.2	-	• Adjust using screw



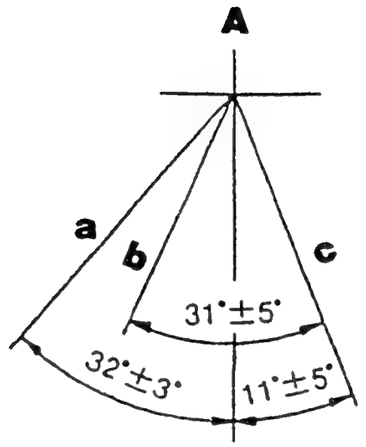


Figure 82

A = CONTROL LEVER ANGLE

1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule

a = Stop
b = Idling
c = Full-speed

■ Note
- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

Test oil
ISO 4113 or
SAE J967d

ZEXEL - TEST VALUES

Distributor pumps
Engine model: TD27

BOSCH No.	9 460 610 336
ZEXEL No.	104740-7680
Date:	31.10.1992 [2]
Company:	NISSAN DIESEL
No.	16700 43G19

Injection pump no.: 104640-9562 (NP-VE4/10F2150RNP558)

Pump rot.: Clockwise-viewed from drive side

Test-nozzle holder combination: 1 688 901 000

Test pressure line: 1 680 750 017

1. Setting values

		P. Speed (rpm)	Setting values	Charge-air pressure kPa (mmHg)	Difference in delivery (cm³)
1-1	Timing device travel	1700	4.7 - 5.1 (mm)		
1-2	Supply pump pressure	1700	549-608 (5.6-6.2)kPa (kgf/cm²)		
1-3	Full load delivery	1100	49.8 - 50.8 (cm³/1000st)		3.0
	Full load delivery		(cm³/1000st)		
1-4	Idle speed regulation	350	5.3 - 9.3 (cm³/1000st)		2.0
1-5	Start	100	45.0 - 80.0 (cm³/1000st)		
1-6	Full-load speed regulation	2350	32.2 - 36.2 (cm³/1000st)		
1-7	Load-timer adjustment				

2. Test values

2-1 Timing device	N = rpm	1100	1700	2150	2550
	mm	2.0-3.2	4.6-5.2	6.0-7.2	6.8-7.8
2-2 Supply pump	N = rpm		1700	2150	
	kPa		549-608	647-706	
	(kgf/cm²)		(5.6-6.2)	(6.6-7.2)	
2-3 Overflow delivery	N = rpm	1100			
	cm³/10s	43.0-87.0			

2-4 Fuel injection quantities

Speed control lever pos.	P. Speed (rpm)	Fuel delivery (cm³/1000st)	Charge-air pres kPa (mmHg)	Difference in delivery (cm³)
End stop	1100	49.3 - 51.3		
	600	48.8 - 52.8		
	2150	38.7 - 42.9		
	2350	31.7 - 36.7		
	2550	5.6 - 14.6		
	2700	below 5.0		
Switch off	350	0		
Idle-stop	350	5.3 - 9.3		
	450	below 3.0		

2-5 Solenoid: Cut-in voltage max.:8V
Test voltage: 12 - 14V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.8 - 1.0 mm
BCS	- mm
~~Pre-st.~~	- mm
Control lever angle	
α	51.5°- 59.5°deg
Ya	26.3 - 28.7 mm
β	31°- 41° deg
B	9.3 - 12.9 mm
γ	- deg
C	- mm

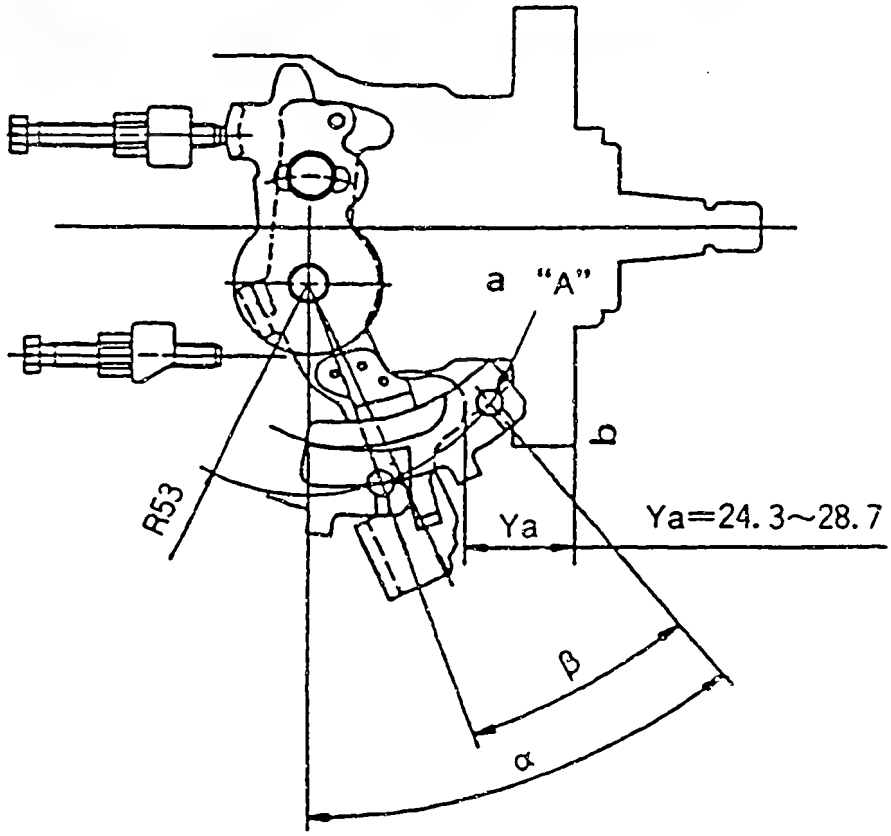


Figure 83 104740-7680 2/2

a = Hole
b = Flange

Control Lever Angle Measurement Position

1. Measure the control lever angles (α, β, γ) at hole „A".

Test oil:
ISO 4113 or
SAE J967d

ZEXEL - VALUES
Distributors pumps
Engine model: 4D56-T

BOSCH No.	9 460 610 523
ZEXEL No.	104740-8182
Date:	31.10.1992 [0]
Company:	MITSUBISHI
No.	MD167348

Injection pump no.: 104640-8182 (NP-VE4/10F2100RNP952)

Pump rot.: Clockwise-viewed from drive side

Test-nozzle holder combination: 1 688 901 022

Test pressure line: 1 680 750 073

1. Setting values

		P. Speed (rpm)	Setting values	Charge air pressure kPa (mmHg)	Difference in delivery (cm³)
1-1	Timing device travel	1000	3.5 - 3.9 (mm)	72.0-74.6 (540-560)	
1-2	Supply pump pressure	1000	382-441 (3.9-4.5) kPa (kgf/cm²)	72.0-74.6 (540-560)	
1-3	Full load delivery	2000(FULL)	64.6 - 65.6 (cm³1000st)	72.0-74.6 (540-560)	5.0
	Full load delivery	750(BCS)	63.4 - 64.4 (cm³1000st)	42.7-45.3 (320-340)	
1-4	Idle speed regulation	375	14.9 - 17.9 (cm³1000st)	0	2.5
1-5	Start	100	67.0 - 87.0 (cm³1000st)	0	
1-6	Full-load speed regulation	2650	24.9 - 30.9 (cm³1000st)	72.0.74.6 (540-560)	5.5
1-7	Load timer adjustment	1000	T-0.5-0.9 (mm)	72.0.74.6 (540-560)	

2. Test values

		C.air pres	72.0-74.6 (540-560) mmHg					
2-1 Timing device	N = rpm	500	1000	1250	1500	2000	2100
	mm	0.7-2.3	3.4-4.0	4.1-5.3	5.1-6.3	7.2-8-4	7.3-8.2
2-2 Supply pump	N = rpm		1000		1500		2100
	kPa (kgf/cm²)		382-441 (3.9-4.5)		500-559 (5.1-5.7)		637-696 (6.5-7.1)
2-3 Overflow delivery	N = rpm		1000				
	cm³/10s		48.0-92.0				

2-4 Fuel injection quantities

Control lever position	P. Speed (rpm)	Fuel delivery (cm³/1000st)	Charge-air pressure kPa(mmHg)	Difference in delivery(cm³)
End stop	2000(FULL)	64.1 - 66.1	72.0-74.6 (540-560)	
	750(BCS)	62.9 - 64.9	42.7-45.3 (320-340)	
	600	46.0 - 51.0	0	
	1250	68.2 - 73.2	72.0-74.6 (540-560)	
	2100	62.5 - 65.5	72.0-74.6 (540-560)	
	2650	24.4 - 31.4	72.0-74.6 (540-560)	
	*1 2950	below 5.0	72.0-74.6 (540-560)	
Switch off	375	0	0	
Idle	750	below 3.0	0	
stop	375	14.4 - 18.4	0	
Partial load	*2 900	7.5 - 19.5	0	
2-5 Solenoid	Cut-in voltage max.: 8V Test voltage: 12 - 14V			

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.6 - 0.8 mm
BCS	- mm
Full st.	- mm
Control lever angle	
α	55°- 63° deg
A	8.3 - 14.8 mm
β	37°- 47° deg
B	11.7 - 15.3 mm
γ	- deg
C	- mm

1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure: 72.0 - 75.0 kPa (640-660) mmHg
Pump Speed : 1000 rpm
Fuel Injection: 49.5 - 51.0 cm^3/1000st
Quantity

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values (Item 1-7).

2. Confirmation of Timer Characteristics

Fix the control lever in the position satisfying the following conditions, and confirm the Timer Stroke.

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cm^3/1000st)	Boost press. kPa(mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1000	49.0 - 51.0	72.0-75.0 (540-560)	-	0.4 - 1.0
1000	38.5 - 41.5	72.0-75.0 (540-560)	-	1.2 - 2.4

Note:

- For items *, confirmation is as follows:

  1. Insert the shims (1 mm thick) between the control lever and the full-speed stopper bolt.
  2. Confirm the fuel injection quantity at the specified pump speed.

- Insert an 8.9 mm partial characteristics shim (for V-actuator adjustment) and measure the fuel injection quantity (for items marked *2).

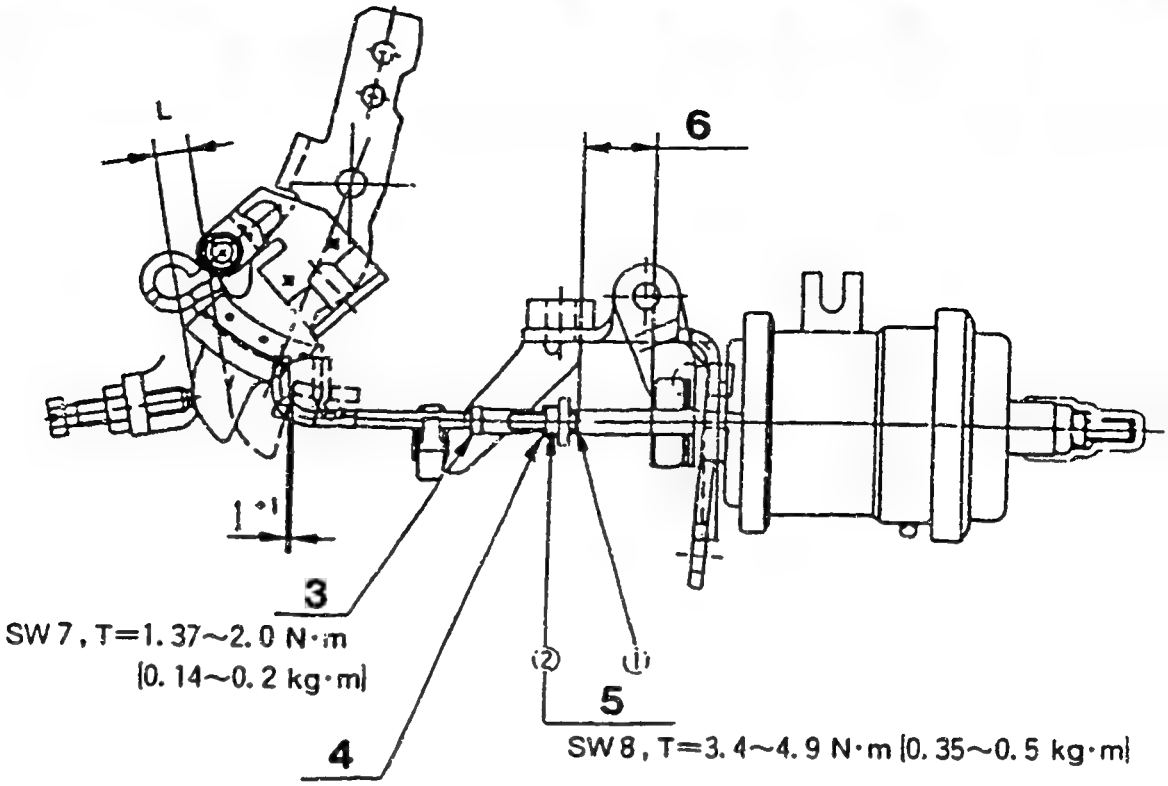


Figure 84 104740-8182 3/4

3 = Rod position adjusting nut
4 = Rod position adjusting nut
5 = Stroke adjusting nut
6 = Actuator stroke

2-STAGE ACTUATOR ADJUSTMENT SPECIFICATIONS

Actuator Adjustment

1. Attach the actuator to the injection pump.
2. Move the control lever to the idle position.

(Continued)

3. Adjust the rod position adjusting nut so that the clearance between the control lever and rod is 1^{+1} mm.

4. Insert a shim of thickness L mm (determind from the partial injection quantities graph) between the control lever and the idle stopper.

5. Adjust the screw (1) so that a full actuator stroke is obtained at the above control lever angle. Then, fix the screw using the nut (2).

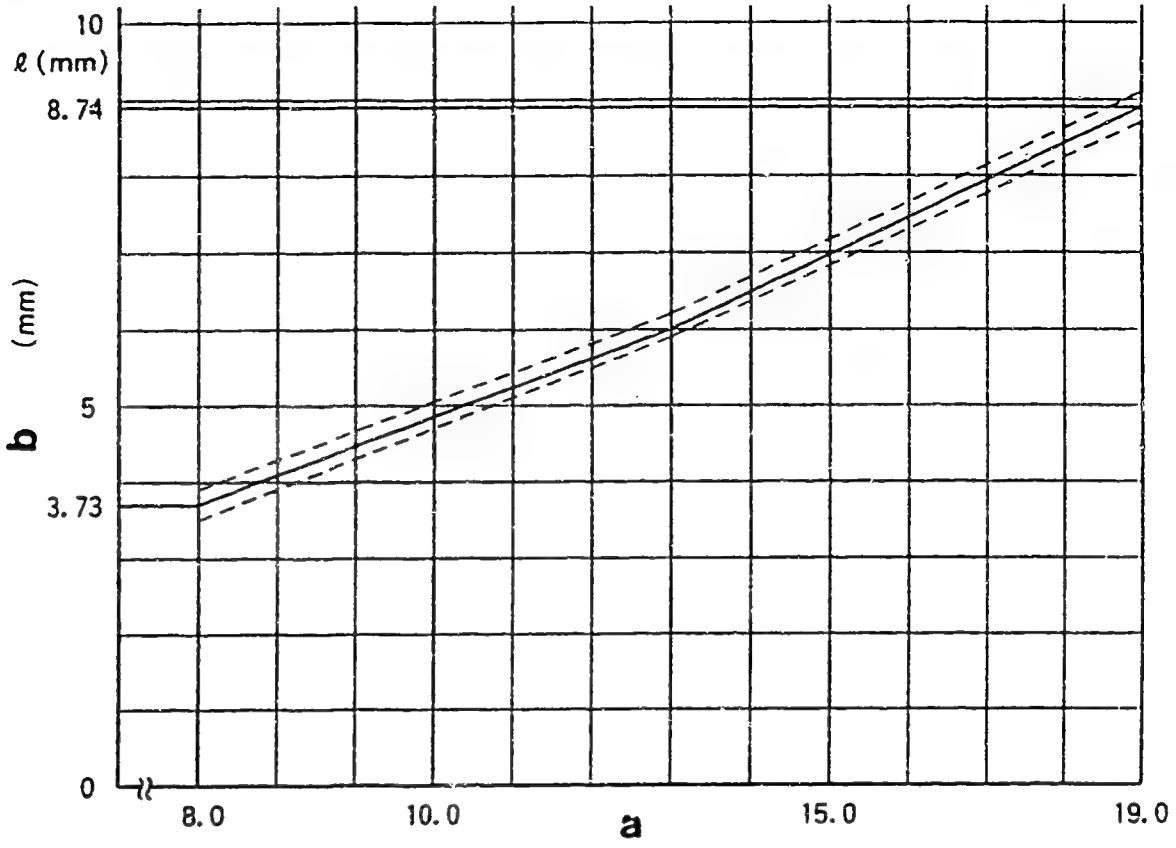


Figure 85 104740-8182 4/4

a = Fuel injection quantity (cm^3/1000st)
b = Shim thickness

Graph of actuator stroke adjusting shim thickness for partial fuel injection quantities.

At NP = 900 rpm, insert an 8.9 mm shim between the control lever and the idle stopper and measure the fuel injection quantity.

Actuator stroke adjustment points (for reference)

Injection quantity specification		Actuator stroke set position		
Pump speed (rpm)	Injection quantity (cm^3/1000st)	Control lever angle	Shim thickness ℓ (mm)	Actuator stroke (mm)
900	7.7 ± 1	(9.5°)		approx. 9.6

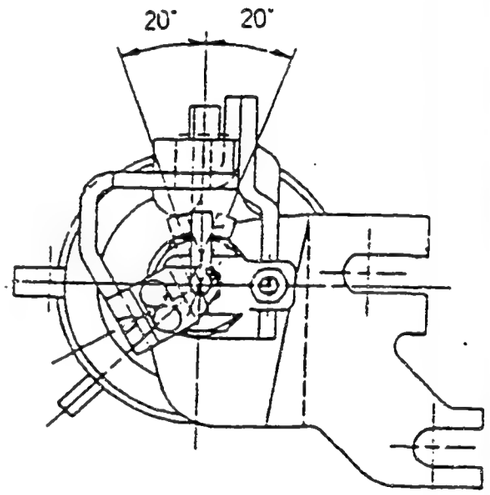


Figure 86

2-stage actuator adjustment specifications

Rod installation position tolerance ± 20°

Test oil
ISO 4113 od
SAE J967d

ZEXEL - TEST VALUES

Distributor pumps
Engine model: 4D56

BOSCH No.	9 460 610 537
ZEXEL No.	104740-8431
Date:	31.10.1992 [2]
Company:	MITSUBISHI
No.	MD183698

Injection pump no.: 104640-8431 (NP-VE4/10F2000RNP1049)

Pump rot.: Clockwise-viewed from drive side

Test-nozzle holder combination: 1 688 901 000

Test pressure line: 1 680 750 017

1. Setting values

		P. Speed (rpm)	Setting values	Charge-air pressure kPa (mmHg)	Difference in delivery (cm³)
1-1	Timing device travel	1250	4.3 - 4.7 (mm)		
1-2	Supply pump pressure	1250	451-490(4.6-5.0) kPa (kgf/cm²)		
1-3	Full load delivery	1250	43.3 - 44.3 (cm³/1000st)		3.0
	Full load delivery		- (cm³/1000st)		
1-4	Idle speed regulation	375	8.5 - 11.5 (cm³/1000st)		2.0
1-5	Start	100	63.0 - 83.0 (cm³/1000st)		
1-6	Full-load speed regulation	2150	15.1 - 21.1 (cm³/1000st)		4.0
1-7	Load-timer adjustment	1250	T-0.8-1.2 (mm)		
1-8					

2. Test values

2-1 Timing device	N = rpm	500	750	1250	1750	2000
	mm	1.4-2.6	2.2-3.4	4.2-4.8	6.0-7.2	7.1-8.0
2-2 Supply pump	N = rpm			1250		2000
	kPa			451-490		618-677
	(kgf/cm²)			(4.6-5.0)		(6.3-6.9)
2-3 Overflow delivery	N = rpm			1250		
	cm³/10s			48.0-92.0		

2-4 Fuel injection quantities

Speed control lever pos.	Pump speed (rpm)	Fuel delivery (cm³/1000st)	Charge-air press. kPa (mmHg)	Difference (cm³)
End stop	1250	42.8 - 44.8		
	600	40.3 - 44.3		
	1750	36.2 - 40.2		
	2000	35.1 - 39.3		
	2150	14.6 - 21.6		
	2500	above 5.0		
Switch off	375	0		
Idle-	750	below 3.0		
	600	below 5.0		
stop	375	8.0 - 12.0		

2-5 Solenoid: Cut-in voltage max. 8 V; Test voltage: 12 - 14 V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.1 - 1.3 mm
BCS	- mm
Prestr.	- mm
Control lever angle	
α	55°- 63° deg
A	10.9 - 16.0 mm
β	40°- 50° deg
B	12.7 - 16.3 mm
γ	- deg
C	- mm

LOAD TIMER ADJUSTMENT

1. Adjustment

1) Fix the control lever in the position satisfying the following conditions:

Boost Pressure:	-	kPa (mmHg)
Pump Speed :	1250	rpm
Fuel Injection Quantity :	35.2 - 36.2	cm^3/1000st

2) With the control lever positioned as described in 1) above, adjust the governor sleeve so that the Timer Stroke conforms to the specified values (item 1-7).

Control lever position			Specified values	
Pump speed (rpm)	Fuel injection quantity (cm^3/1000st)	Boost pressure kPa (mmHg)	Timer stroke (mm)	Timer stroke reduction value (mm)
1250	34.7 - 36.7	-	-	0.7 - 1.3
1250	26.7 - 29.7	-	-	1.8 - 2.4

Test oil
ISO 4113 or
SAE J967d

ZEXEL - TEST VALUES

Distributor pumps
Engine model: TD27

BOSCH No.	9 460 610 538
ZEXEL No.	104740-9573
Date:	31.10.1992 [1]
Company:	NISSAN DIESEL
No.	16700 43G20

Injection pump no.: 104640-9572 (NP-VE4/10F2150RNP559)

Pump rot.: Clockwise-viewed from drive side

Test-nozzle holder combination: 1 688 901 000

Test pressure line: 1 680 750 017

1. Setting values

		P. Speed (rpm)	Setting values	Charge-air pressure kPa (mmHg)	Difference in delivery (cm³)
1-1	Timing device travel	1700	4.7 - 5.1 (mm)		
1-2	Supply pump pressure	1700	549-608(5.6-6.2) kPa (kgf/cm²)		
1-3	Full load delivery	1100	49.8 - 50.8 (cm³/1000st)		3.0
	Full load delivery		(cm³/1000st)		
1-4	Idle speed regulation	350	5.3 - 9.3 (cm³/1000st)		2.0
1-5	Start	100	45.0 - 80.0 (cm³/1000st)		
1-6	Full-load speed regulation	2350	32.2 - 36.2 (cm³/1000st)		
1-7	ACS adjustment	1100	39.7 - 42.7 (cm³/1000st)	-21.9±0.7 (-164±5)	

2. Test values

2-1 Timing device	N = rpm	1100	1700	2150	2550
	mm	2.2-3.0	4.6-5.1	6.0-7.2	6.8-7.8
2-2 Supply pump	N = rpm		1700	2150	
	kPa		549-608	647-706	
	(kgf/cm²)		(5.6-6.2)	(6.6-7.2)	
2-3 Overflow delivery	N = rpm	* 1100			
	cm³/10s	43.0-87.0			

2-4 Fuel injection quantities

Speed control lever pos.	P. Speed (rpm)	Fuel delivery (cm³/1000st)	Charge-air press kPa (mmHg)	Difference deliv.(cm³)
End stop	1100	49.3 - 51.3		
	600	48.8 - 52.8		
	1100	39.2 - 43.2	-21.9±0.7 (-164±5)	
	2150	38.7 - 42.9		
	2350	31.7 - 36.7		
	2550	5.6 - 14.6		
	2700	below 5.0		
Switch off	350	0		
Idle-stop	450	below 3.0		
	350	5.3 - 9.3		

2-5 Solenoid: Cut-in voltage max.:8V
Test voltage: 12 - 14V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	0.8 - 1.0 mm
BCS	- mm
~~Pre-st.~~	- mm
Control lever angle	
α	51.5°- 59.5°deg
Ya	24.3 - 28.7 mm
β	31°- 41° deg
B	9.3 - 12.9 mm
γ	- deg
C	- mm

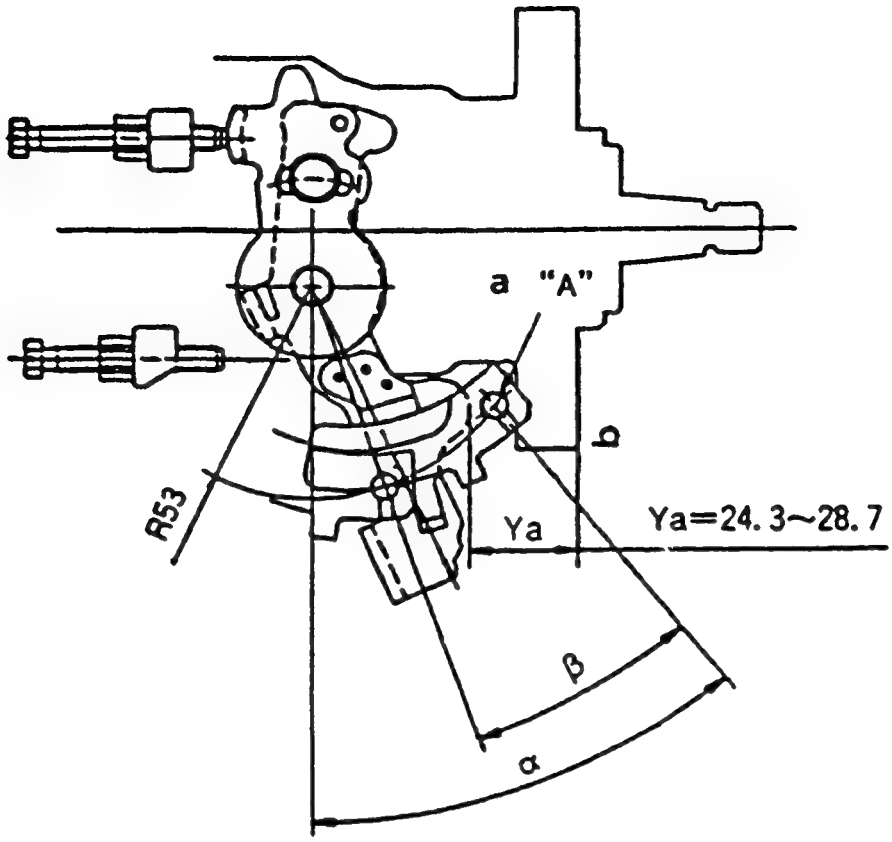


Figure 87 104740-9573 2/3

a = Hole
b = Flange

CONTROL LEVER ANGLE MEASUREMENT POSITION

1. Measure the control lever angles (α, β, γ) at hole „A".

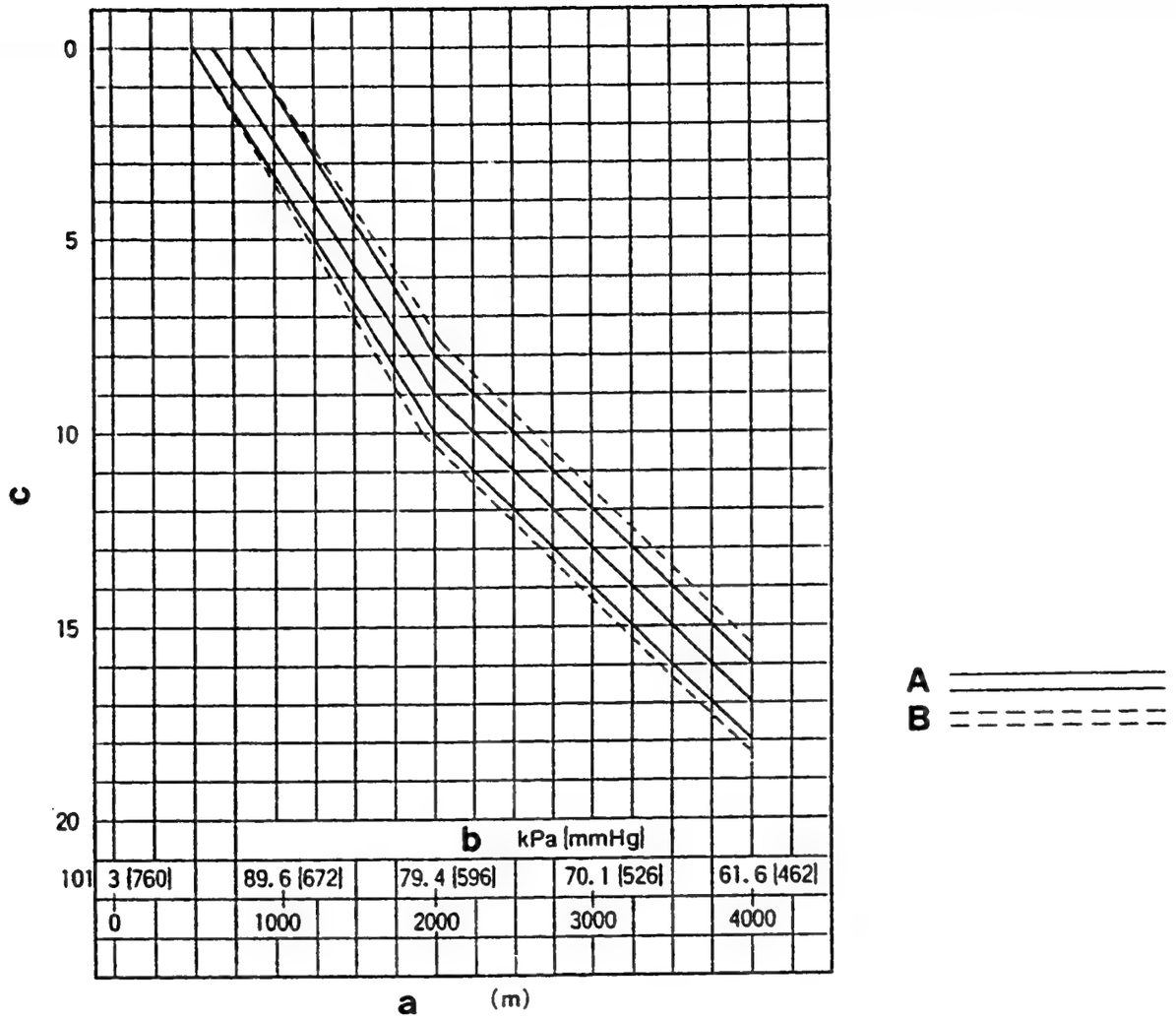


Figure 88

a = Altitude
b = Atmospheric pressure
c = Injection quantity decrease (cm³/1000st)

A = Adjustment value
B = Inspection value

FULL-LOAD FUEL INJECTION QUANTITY AND ACS ADJUSTING PROCEDURE AT HIGH ALTITUDES

1. FULL-LOAD FUEL INJECTION QUANTITY ADJUSTMENT
   1) Remove the ACS cover, the bellows and the adjusting shims.
   2) Perform all adjustments as described in the adjusting specifications, except for ACS adjustment.
2. ACS ADJUSTMENT
   1) Attach the ACS cover, the bellows and the adjusting shims.
   2) At a pump speed of 1100 rpm and refering to the graph above, use the shims to adjust the fuel injection quantity decrease according to the altitude.

Test oil:
ISO 4113 or
SAE J967d

ZEXEL-TEST VALUES

Distributors pumps
Engine model: D201-02

BOSCH No.	9 460 610 526
ZEXEL No.	104741-5322
Date:	31.10.1992 [0]
Company:	ISUZU
No.	8970266733

Injection pump no.: 104641-5322 (NP-VE4/11F1050LNP959)

Pump rotation: Counter clockwise viewed from drive side

Test-nozzle holder combination: 1 688 901 022

Test pressure line: 1 680 750 073

1. Setting values

		P. Speed (rpm)	Setting values	Charge air pressure kPa (mmHg)	Difference in delivery (cm³)
1-1	Timing device travel	1100	1.4 - 1.8 (mm)		
1-2	Supply pump pressure	1100	500-539(5.1-5.5) kPa (kgf/cm²)		
1-3	Full load delivery	800	29.2 - 30.2 (cm³/1000st)		3.0
	Full load delivery		(cm³/1000st)		
1-4	Idle speed regulation	500	19.7 - 21.7 (cm³/1000st)		3.0
1-5	Start	100	above 70.0 (cm³/1000st)		
1-6	Full-load speed regulation	1100	24.0 - 26.0 (cm³/1000st)		3.0
1-7	Load-timer adjustment				
1-8					

2. Test values

2-1 Timing device	N = rpm mm	1000 1.3 - 1.9		
2-2 Supply pump	N = rpm kPa (kgf/cm²)			1100 500 - 539 (5.1 - 5.5)
2-3 Overflow delivery	N = rpm cm³/10s		1050 48.3 - 91.7	

2-4 Fuel injection quantities

Control lever position	Pump Speed (rpm)	Fuel delivery (cm³/1000 strokes)	Charge air pressure kPa (mmHg)
End stop	800	28.7 - 30.7	
	1050	32.2 - 37.2	
	1100	23.5 - 26.5	
	1200	below 3.0	
Switch off	500	0	
Idle	600	below 3.0	
stop	500	19.7 - 21.7	

2-5 Solenoid	Cut-in voltage max. 8 V Test voltage: 12 - 14 V

3. Dimensions

K	2.7 - 2.9	mm
KF	4.9 - 5.1	mm
MS	2.0 - 2.2	mm
BCS	-	mm
Pre-str.	0.43 - 0.47	mm
Control lever angle		
α	5°- 9°	deg
A	53.3 - 55.6	mm
β	12°- 22°	deg
B	3.9 - 7.2	mm
γ	-	deg
C	-	mm

- Adjust the pump with the magnet valve OFF.

Test oil:
ISO 4113 or
SAE J967d

ZEXEL - TEST VALUES

Distributor pumps
Engine model: CD17

BOSCH No.	9 460 610 533
ZEXEL No.	104748-2381
Date:	31.10.1992 [0]
Company:	NISSAN
No.	16700 16A68

Injection pump no.: 104648-2181 (NP-VE4/8F2500LNP164)

Pump rotation: Counter clockwise viewed from drive side

Test-nozzle holder combination: 1 688 901 000

Test pressure line: 1 680 750 017

1. Setting values

		P. Speed (rpm)	Setting values	Charge air pressure kPa (mmHg)	Difference in delivery (cm³)
1-1	Timing device travel	1200	1.8 - 2.4 (mm)		
1-2	Supply pump pressure	1200	304-363 (3.1-3.7) kPa (kgf/cm²)		
1-3	Full load delivery	1200	29.5 - 30.5 (cm³/1000st)		2.5
	Full load delivery		(cm³/1000st)		
1-4	Idle speed regulation	400	8.3 - 11.3 (cm³/1000st)		3.0
1-5	Start	100	45.3 - 55.3 (cm³/1000st)		
1-6	Full-load speed regulation	2700	11.9 - 17.9 (cm³/1000st)		
1-7	Load-timer adjustment				
1-8					

2. Test values

2-1 Timing device	N = rpm	1200	1800	2500
	mm	1.7 - 2.5	4.0 - 5.2	6.8 - 8.0
2-2 Supply pump	N = rpm	1200	1800	2500
	kPa	294 - 373	431 - 510	598 - 677
	(kgf/cm²)	(3.0 - 3.8)	(4.4 - 5.2)	(6.1 - 6.9)
2-3 Overflow delivery	N = rpm	1200		
	cm³/10s	36.0 - 80.0		

2-4 Fuel injection quantities

Control lever position	Pump Speed (rpm)	Fuel delivery (cm³/1000 strokes)	Charge air pressure kPa (mmHg)
End stop	1200	29.0 - 31.0	
	600	24.8 - 28.8	
	2500	26.7 - 30.7	
	2700	11.4 - 18.4	
	2900	below 6.0	
Switch off	400	0	
Idle	400	7.8 - 11.8	
stop	600	below 3.0	
Partial load	700	13.3 - 20.0	
2-5 Solenoid	Cut-in voltage max. 8 V Test voltage: 12 - 14 V		

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.7 - 1.9 mm
BCS	- mm
Pre-str.	- mm
Control lever angle	
α	1° - -1° deg
Ya	15.4 - 18.1 mm
β	37° - 47° deg
B	10.7 - 14.8 mm
γ	10.5° - 11.5° deg
C	6.7 - 7.3 mm

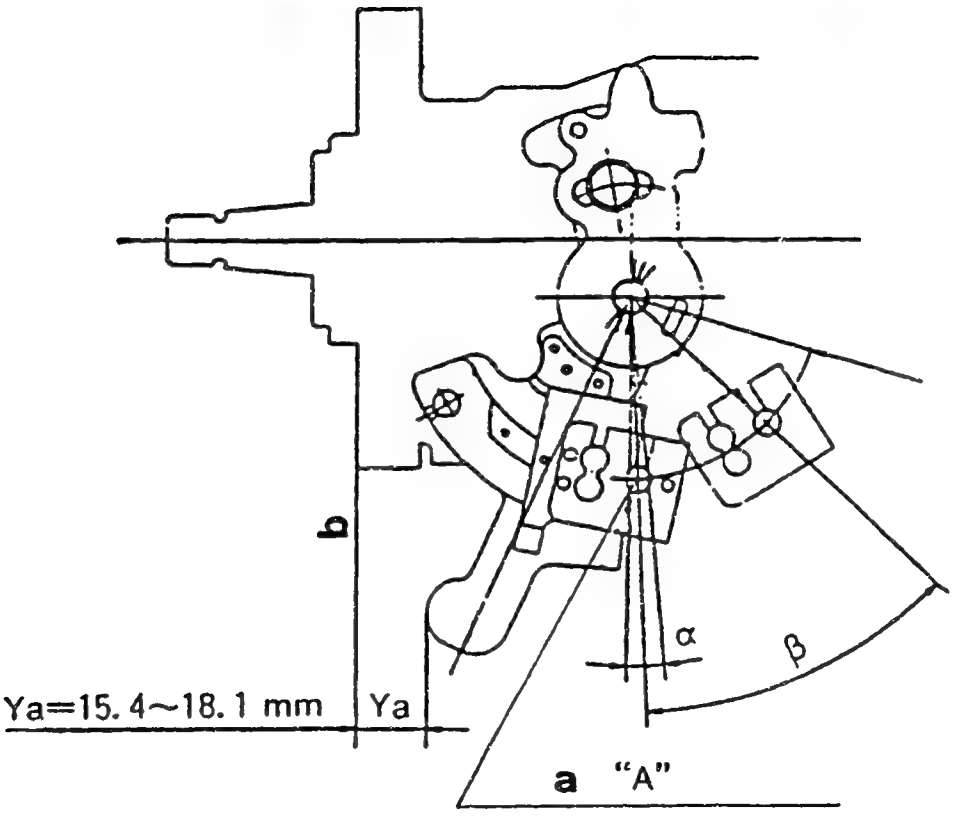


Figure 89 104748-2381 2/4

a = Hole
b = Flange

CONTROL LEVER ANGLE MEASUREMENT POSITION

1. Measure the control lever angles (α, β, γ) at hole „A".

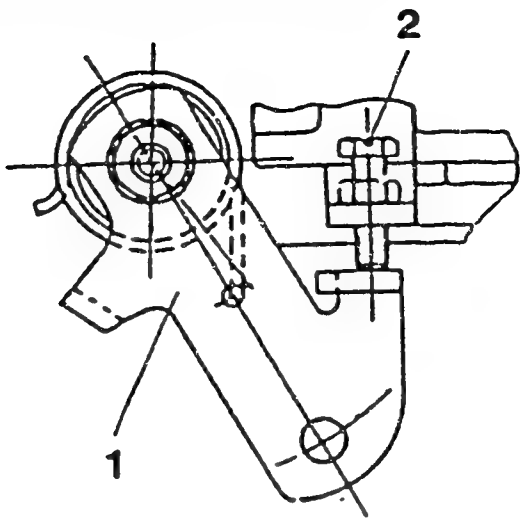


Figure 90

104748-2381 2/4
(continued)

1 = Stop lever
2 = Adjusting bolt

STARTING INJECTION QUANTITY ADJUSTMENT

Adjust the starting injection quantity (item 1-5) using the adjusting bolt.

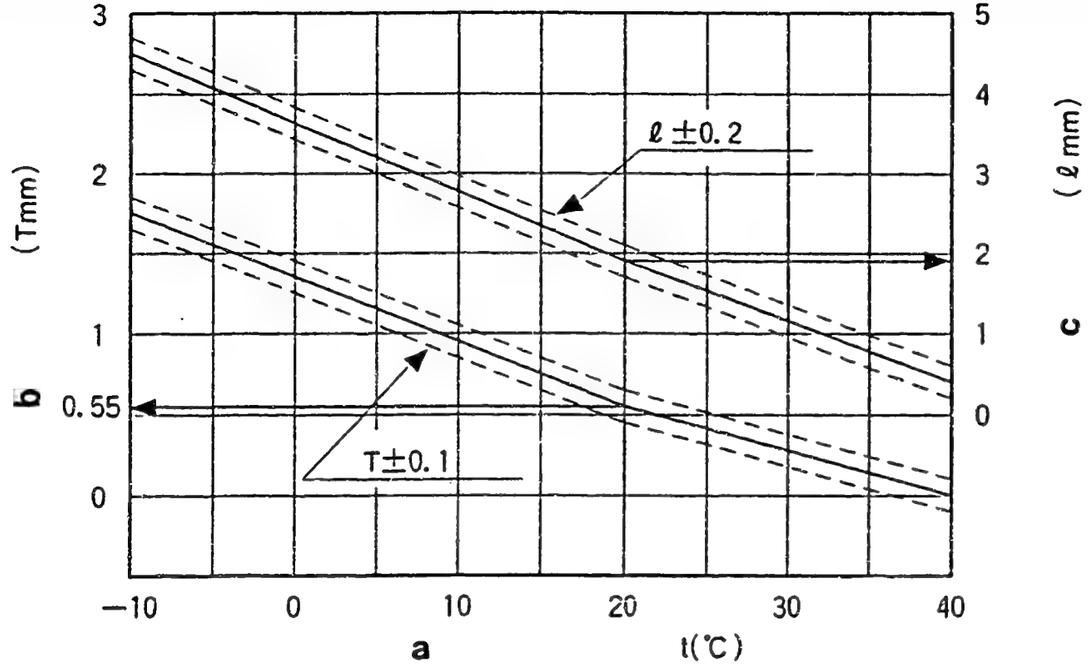


Figure 91

a = Atmospheric temperature
b = Timer stroke
c = Gap between control lever and idling stopper bolt

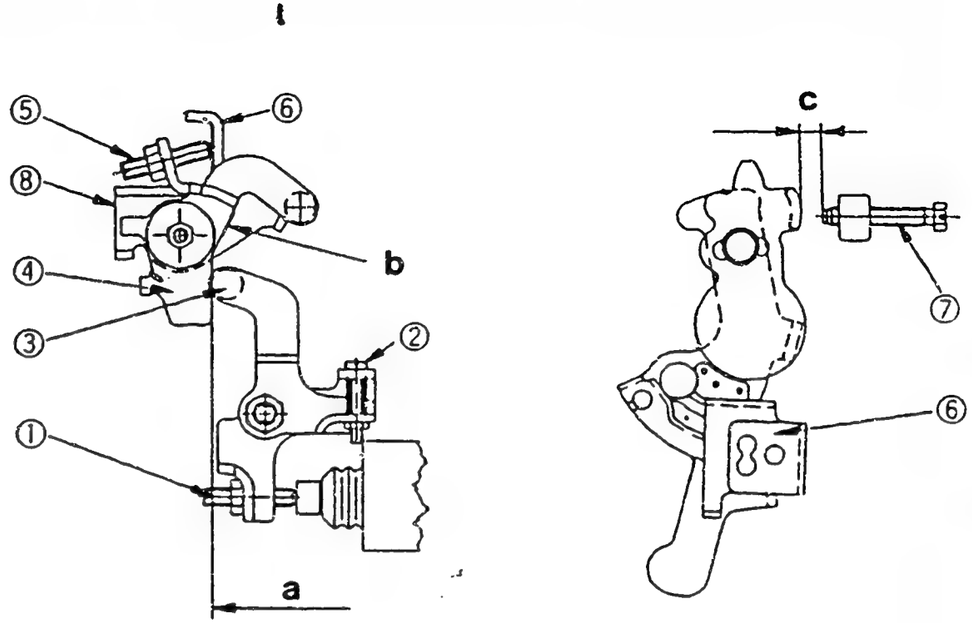


Figure 92

a = Vertical position
b = Aligning mark
c = Block gauge

W-CSD ADJUSTMENT

1. Timer Stroke Adjustment (adjust to the thick line)

1) Calculate the timer stroke from Fig. 91 according to the atmospheric temperature at the time of adjustment.

2) Adjust using the timer stroke adjusting screw so that the timer stroke is as calculated in Step 1.

(Continued)

2. Intermediate Lever Position Adjustment

1) Insert a block gauge (thickness gauge) of 1.9 ± 0.05 mm thickness between the control lever and the idling stopper bolt.

2) Align the intermediate lever with the aligning mark.

3) Adjust the intermediate lever set screw so that the control lever and the intermediate lever set screw are in contact, and then fix in position using the locknut.

3. CSD Lever Adjustment (adjust to the thick line)

1) Calculate the block gauge dimension ℓ ± 0.05 mm from Fig. 91 according to the atmospheric temperature at the time of adjustment.

2) Insert the block gauge (thickness gauge) between the control lever and the idling stopper bolt.

3) Using the idling bolt, adjust so that the CSD lever roller and the intermediate lever are in contact.

4. Final Adjustment

After completing the adjustment, screw the timer stroke adjusting screw two turns clockwise.
(Move from the temporary adjustment chart to the final adjustment chart).

Note:

1. The temperature of the wax must be below 30°C when adjusting.

2. When inserting a block gauge (thickness gauge) between the control lever (bracket) and the idling stopper bolt, use the idling adjusting bolt to separate the CSD lever and the intermediate lever so that no excessive force is exerted on them.

$-10 \leq \theta$ (°C) ≤ 20	TA = -0.0367 θ + 1.284	$-10 \leq \theta$ (°C) ≤ 20	ℓ = -0.0867 θ + 3.63
$20 \leq \theta$ (°C) ≤ 40	TA = -0.0275 θ + 1.1	$20 \leq \theta$ (°C) ≤ 40	ℓ = -0.075 θ + 3.4

Test oil:
ISO 4113 or
SAE J967d

ZEXEL - TEST VALUES

Distributor pumps
Engine model: CD17

BOSCH No.	9 460 610 534
ZEXEL No.	104748-2391
Date:	31.10.1992 [2]
Company:	NISSAN
No.	16700 16A73

Injection pump no.: 104648-2181 (NP-VE4/8F2500LNP164)

Pump rotation: Counter clockwise viewed from drive side

Test-nozzle holder combination: 1 688 901 000

Test pressure line: 1 680 750 017

1. Setting values

		P. Speed (rpm)	Setting values	Charge air pressure kPa (mmHg)	Difference in delivery (cm³)
1-1	Timing device travel	1200	1.8 - 2.4 (mm)		
1-2	Supply pump pressure	1200	304-363(3.1-3.7) kPa (kgf/cm²)		
1-3	Full load delivery	1200	29.5 - 30.5 (cm³/1000st)		2.5
	Full load delivery		(cm³/1000st)		
1-4	Idle speed regulation	400	5.3 - 8.3 (cm³/1000st)		3.0
1-5	Start	100	45.3 - 55.3 (cm³/1000st)		
1-6	Full-load speed regulation	2700	11.9 - 17.9 (cm³/1000st)		
1-7	Load-timer adjustment				
1-8					

2. Test values

2-1 Timing device	N = rpm	1200	1800	2500
	mm	1.7 - 2.5	4.0 - 5.2	6.8 - 8.0
2-2 Supply pump	N = rpm	1200	1800	2500
	kPa	294 - 373	431 - 510	598 - 677
	(kgf/cm²)	(3.0 - 3.8)	(4.4 - 5.2)	(6.1 - 6.9)
2-3 Overflow delivery	N = rpm	1200		
	cm³/10s	36.0 - 80.0		

2-4 Fuel injection quantities

Control lever position	Pump Speed (rpm)	Fuel delivery (cm³/1000 strokes)	Charge air pressure kPa (mmHg)
End stop	1200	29.0 - 31.0	
	600	24.8 - 28.8	
	2500	26.7 - 30.7	
	2700	11.4 - 18.4	
	2900	below 6.0	
Switch off	400	0	
Idle	400	4.8 - 8.8	
stop	600	below 3.0	
Partial load	700	10.0 - 20.0	

2-5 Solenoid: Cut-in voltage max. 8 V
Test voltage: 12 - 14 V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.7 - 1.9 mm
BCS	- mm
Pre-str.	- mm
Control lever angle	
α	1°- -1° deg
Ya	15.4 - 18.1 mm
β	39°- 49° deg
B	11.0 - 16.0 mm
γ	13.5°- 14.5°deg
C	8.6 - 9.2 mm

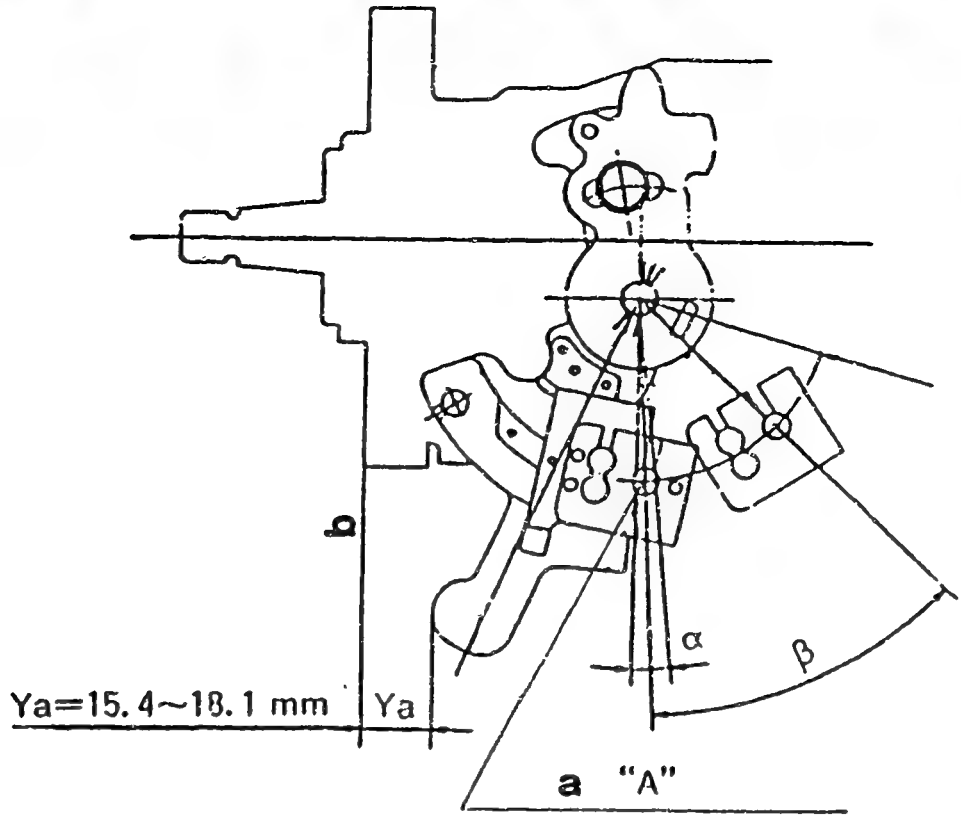


Figure 93 104748-2391 2/4

a = Hole
b = Flange

CONTROL LEVER ANGLE MEASUREMENT POSITION

1. Measure the control lever angles (α, β, γ) at hole „A".

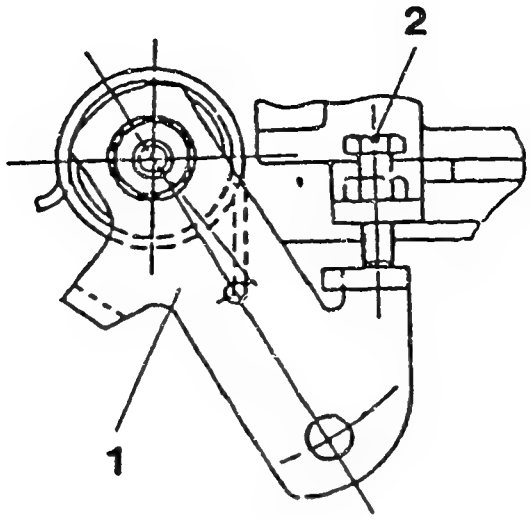


Figure 94

104748-2391 2/4
(continued)

1 = Stop lever
2 = Adjusting bolt

STARTING INJECTION QUANTITY ADJUSTMENT

Adjust the starting injection quantity (item 1-5) using the adjusting bolt.

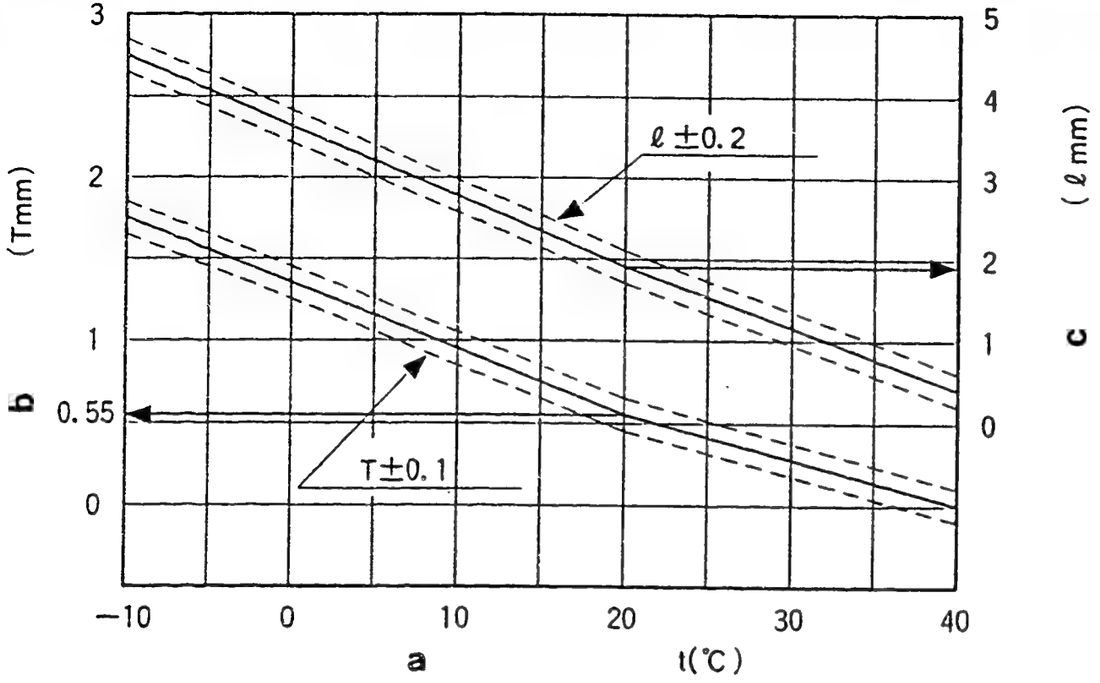


Figure 95

a = Atmospheric temperature
b = Timer stroke
c = Gap between control lever and idling stopper bolt

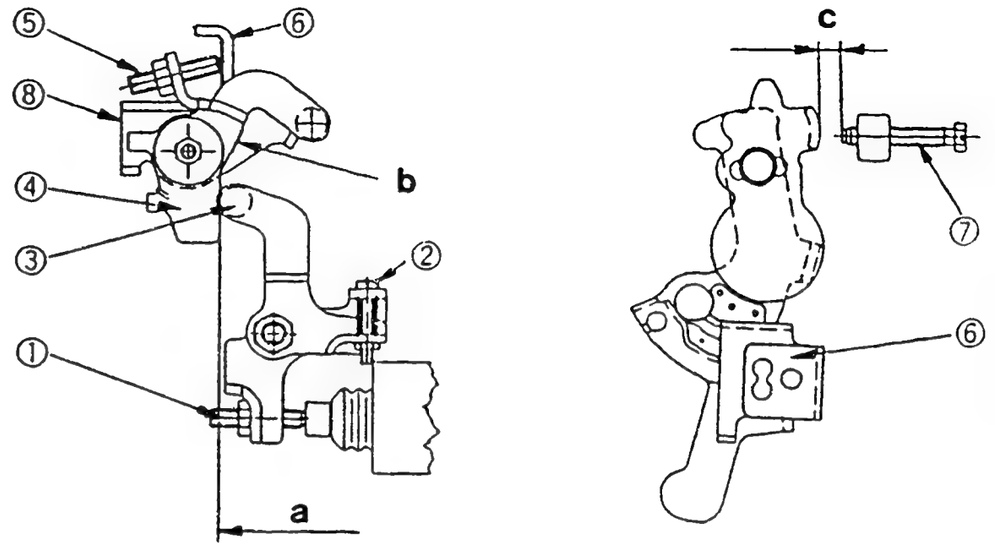


Figure 96

a = Vertical position
b = Aligning mark
c = Block gauge

W-CSD ADJUSTMENT

1. Timer Stroke Adjustment (adjust to the thick line)

1) Calculate the timer stroke from Fig. 95 according to the atmospheric temperature at the time of adjustment.

2) Adjust using the timer stroke adjusting screw so that the timer stroke is as calculated in Step 1.

(Continued)

2. Intermediate Lever Position Adjustment

1) Insert a block gauge (thickness gauge) of 1.9 ± 0.05 mm thickness between the control lever and the idling stopper bolt.

2) Align the intermediate lever with the aligning mark.

3) Adjust the intermediate lever set screw so that the control lever and the intermediate lever set screw are in contact, and then fix in position using the locknut.

3. CSD Lever Adjustment (adjust to the thick line)

1) Calculate the block gauge dimension ℓ ± 0.05 mm from Fig. 95 according to the atmospheric temperature at the time of adjustment.

2) Insert the block gauge (thickness gauge) between the control lever and the idling stopper bolt.

3) Using the idling bolt, adjust so that the CSD lever roller and the intermediate lever are in contact.

4. Final Adjustment

After completing the adjustment, screw the timer stroke adjusting screw two turns clockwise.
(Move from the temporary adjustment chart to the final adjustment chart).

Note:

1. The temperature of the wax must be below 30°C when adjusting.

2. When inserting a block gauge (thickness gauge) between the control lever (bracket) and the idling stopper bolt, use the idling adjusting bolt to separate the CSD lever and the intermediate lever so that no excessive force is exerted on them.

$-10 \leq \theta$ (°C) ≤ 20	$TA = -0.0367\ \theta + 1.284$	$-10 \leq \theta$ (°C) ≤ 20	$\ell = -0.0867\ \theta + 3.63$
$20 \leq \theta$ (°C) ≤ 40	$TA = -0.0275\ \theta + 1.1$	$20 \leq \theta$ (°C) ≤ 40	$\ell = -0.075\ \theta + 3.4$

Test oil
ISO 4113 or
SAE J967d

ZEXEL - TEST VALUES

Distributor pumps
Engine model: C223

BOSCH No.	9 460 610 540
ZEXEL No.	104749-1213
Date:	31.10.1992 [1]
Company:	ISUZU
No.	8942528142

Injection pump no.: 104649-1202 (NP-VE4/9F2175LNP125)

Pump rotation: Counter clockwise-viewed from drive side

Test-nozzle holder combination: 1 688 901 000

Test pressure line: 1 680 750 017

1. Setting values

		P. Speed (rpm)	Setting values	Charge-air pressure kPa (mmHg)	Difference in delivery (cm³)
1-1	Timing device travel	1500	3.8 - 4.2 (mm)		
1-2	Supply pump pressure	1500	510-549(5.2-5.6) kPa (kgf/cm²)		
1-3	Full load delivery	1500	37.9 - 38.9 (cm³/1000st)		3.0
	Full load delivery		(cm³/1000st)		
1-4	Idle speed regulation	350	5.5 - 9.5 (cm³/1000st)		2.0
1-5	Start	100	above 63.0 (cm³/1000st)		
1-6	Full-load speed regulation	2440	10.4 - 16.4 (cm³/1000st)		
1-7	ACS adjustment	1500	Decrease 4.8-6.2 (cm³/1000st)	-21.9±0.7 (-164±5)	

2. Test values

2-1 Timing device	N = rpm	1000	1500	2175	
	mm	1.4-2.6	3.7-4.3	6.1-7.0	
2-2 Supply pump	N = rpm	1000	1500	2175	
	kPa	373-431	510-549	647-706	
	(kgf/cm²)	(3.8-4.4)	(5.2-5.6)	(6.6-7.2)	
2-3 Overflow delivery	N = rpm	1000			
	cm³/10s	52.0-95.0			

2-4 Fuel injection quantities

Speed control lever pos.	P. Speed (rpm)	Fuel delivery (cm³/1000st)	Charge-air press. kPa (mmHg)	Difference deliv.(cm³)
End stop	1500	37.4 - 39.4		
	600	28.4 - 32.4		
	1500	Decrease 4.3-6.7	-21.9±0.7 (-164±5)	
	2175	33.3 - 37.5		
	2440	10.4 - 16.4		
	2550	below 6.0		
Switch off	350	0		
Idle-stop	350	5.5 - 9.5		
	450	below 3.0		

2-5 Solenoid	Cut-in voltage max.:8V Test voltage: 12 - 14V

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.7 - 1.9 mm
BCS	- mm
Pre-st.	- mm
Control lever angle	
α	21°- 29° deg
A	- mm
β	36.5°- 46.5°deg
B	- mm
γ	- deg
C	- mm

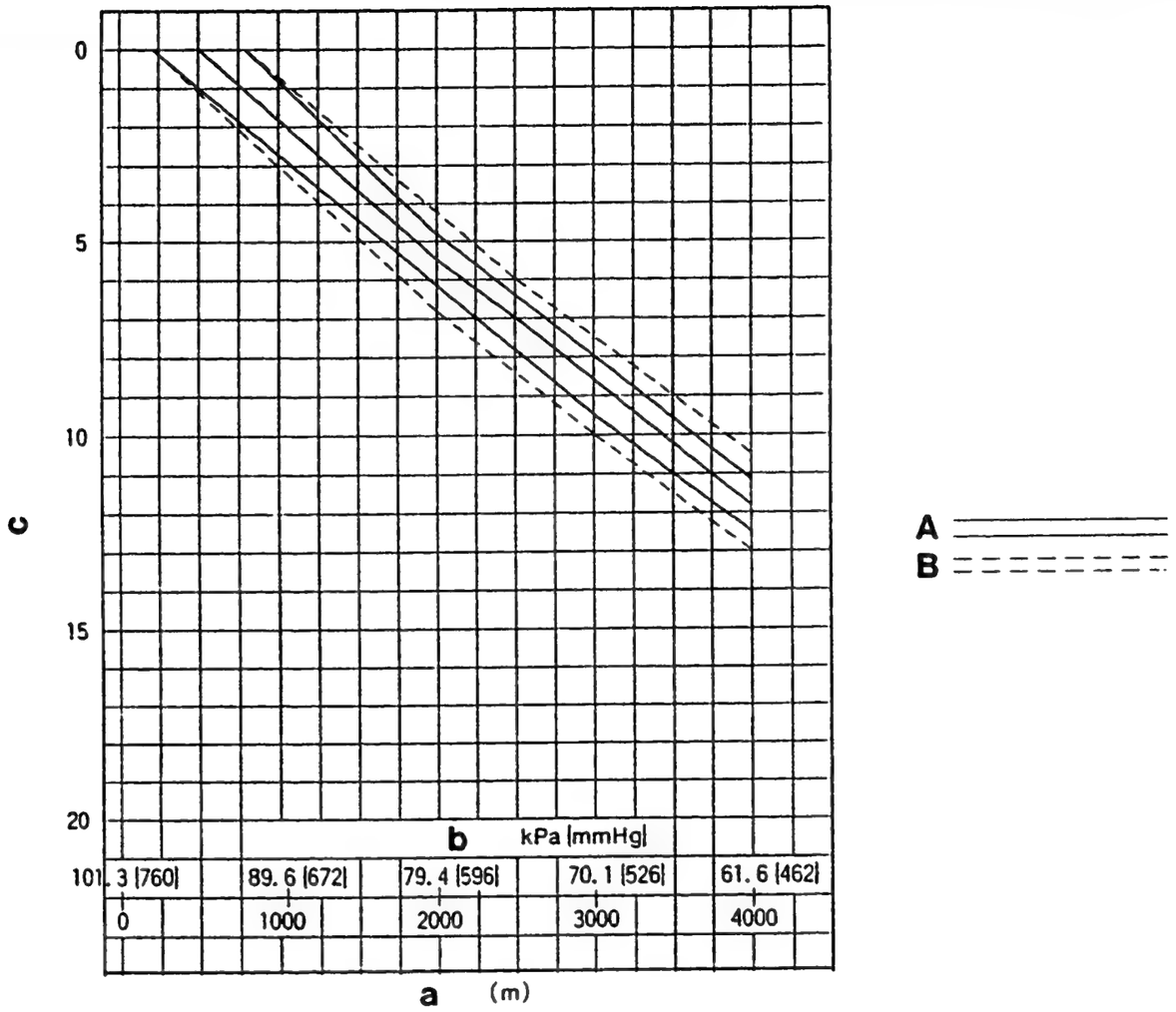


Figure 97

a = Altitude
b = Atmospheric pressure
c = Injection quantity decrease (cm³/1000st)

A = Adjustment value
B = Inspection value

FULL-LOAD FUEL INJECTION QUANTITY AND ACS ADJUSTING PROCEDURE AT HIGH ALTITUDES

1. FULL-LOAD FUEL INJECTION QUANTITY ADJUSTMENT
   1) Remove the ACS cover, the bellows and the adjusting shims.
   2) Perform all adjustments as described in the adjusting specifications, except for ACS adjustment.
2. ACS ADJUSTMENT
   1) Attach the ACS cover, the bellows and the adjusting shims.
   2) At a pump speed of 1500 rpm and refering to the graph above, use the shims to adjust the fuel injection quantity decrease according to the altitude.

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 187	1/4
ZEXEL No.	:	106672-4572	
Date	:	31.10.1992	[3]
Company	:	KOMATSU	
Engine	:	SA6D155 / 6128-71-1035	

IP-Type number	:	106067-8151 / PES6PD
Governor type number	:	105448-9362 / EP/RSUV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	0 681 343 002
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm	:	2.5 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

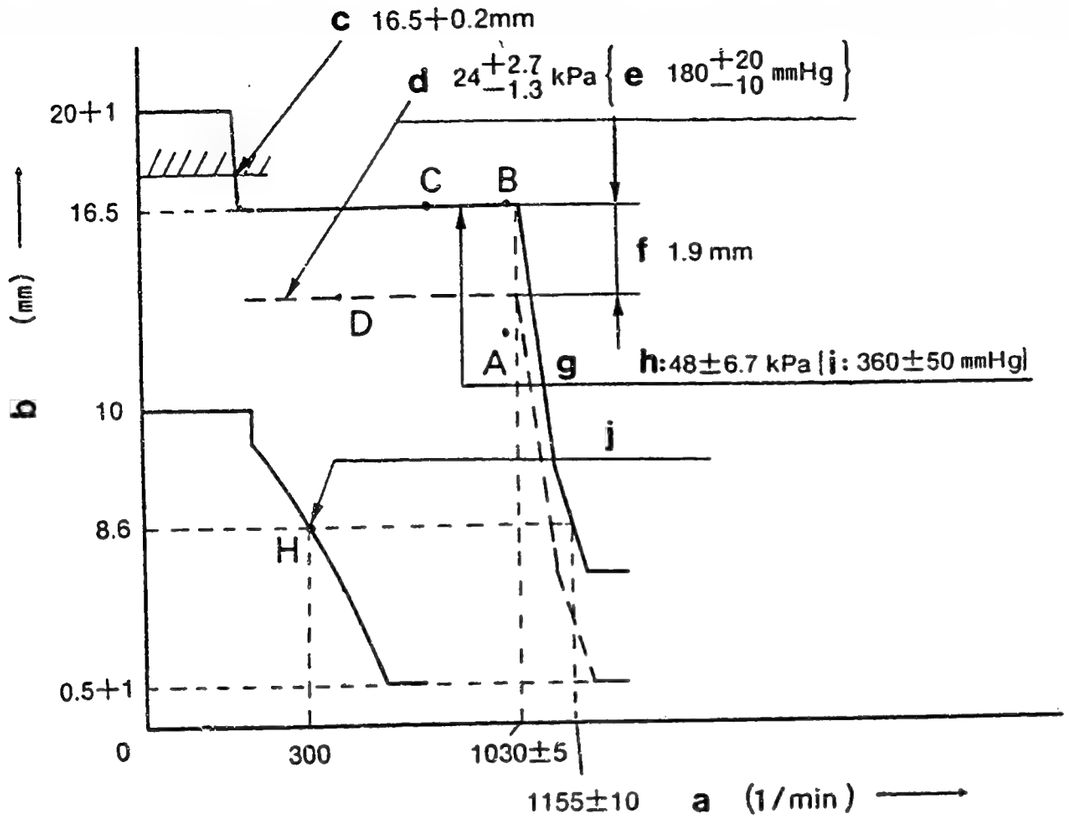
Continued (Test values)

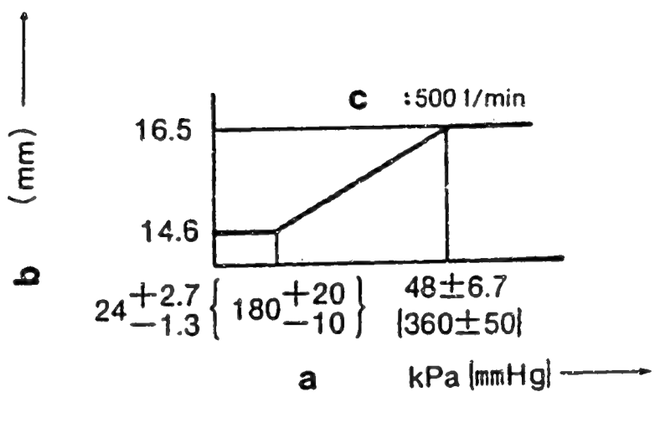
Injection Quantity :

Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	14.3	1000	250.0 ± 5.0	-	Rack	Basic Each cylinder
H	8.6	300	28.0 ± 3.0	± 10.0	Rack	
A	14.3	1000	250.0 ± 5.0	-	Lever	Basic Each cylinder
B	16.5	1000	335.0 ± 2.0	-	Lever	
C	16.5	700	315.0 ± 5.0		Lever	
D	14.6	400	254.0 ± 5.0		Lever	

Timing Advance Specification :

Pump Speed (rpm)					
Advance Angle (deg)					





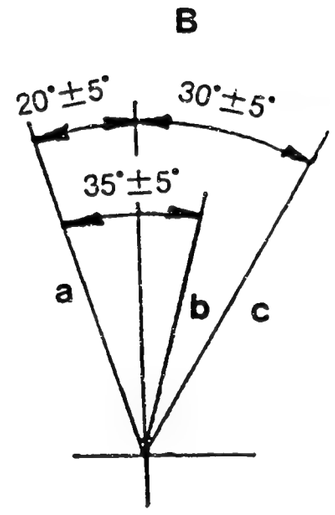


Figure 98 GOVERNOR ADJUSTMENT

Recommended speed droop adjustment screw position: 18
Perform torque control spring adjustment when necessary

106672-4572 2/4

a = Pump speed
b = Control rack position
c = Control rack limit setting:
d = Boost pressure: e = below:
f = Boost compensator stroke:
g = Boost pressure: h/i = above:
j = Idle setting
(Using boost pressure 0)

A = BOOST COMPENSATOR ADJUSTMENT
a = Boost pressure
b = Control rack position
c = Pump speed:

B = Speed Control Lever Angle
a = Full-speed
b = Idling
c = Stop

■ Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

		Pump Speed (rpm)	Rack Position (mm)	Boost pressure kPa (mmHg)	Remarks
Full-load Adjustment (Temporary)		1230 700	16.5 16.5	0 0	• Adjust using screw (2) • Adjust using screw (1)
Torque Control Spring Adjustment	**1.st stroke**	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
	2.st stroke	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Maximum Speed Adjustment		1030 1155 ± 10	16.5 8.6	-	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Boost Compensator System		500 500	14.6 16.5	24+2.7 -1.3 (180+20) -10 48 ± 6.7 (360 ± 50)	• Fix the control lever • Adjust using screw (6) • Confirm the boost compensator stroke is: 1.9 mm
Idling Adjustment 1. Idling Sub Spring		0 300 above 500	10.0 8.6 0.5 ± 1	0 0 0	• Fix the control lever • Adjust using spring capsule (5) • Confirm
2. Control Lever		-	-	-	• Adjust using the control lever
Full-load Adjustment		1030	16.5	above 48 ± 6.7 (360 ± 50)	• Confirm
Control Lever Angle Measurement		• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.			
Control Rack Limiter Adjustment		-	16.5 + 0.2	-	• Adjust using screw

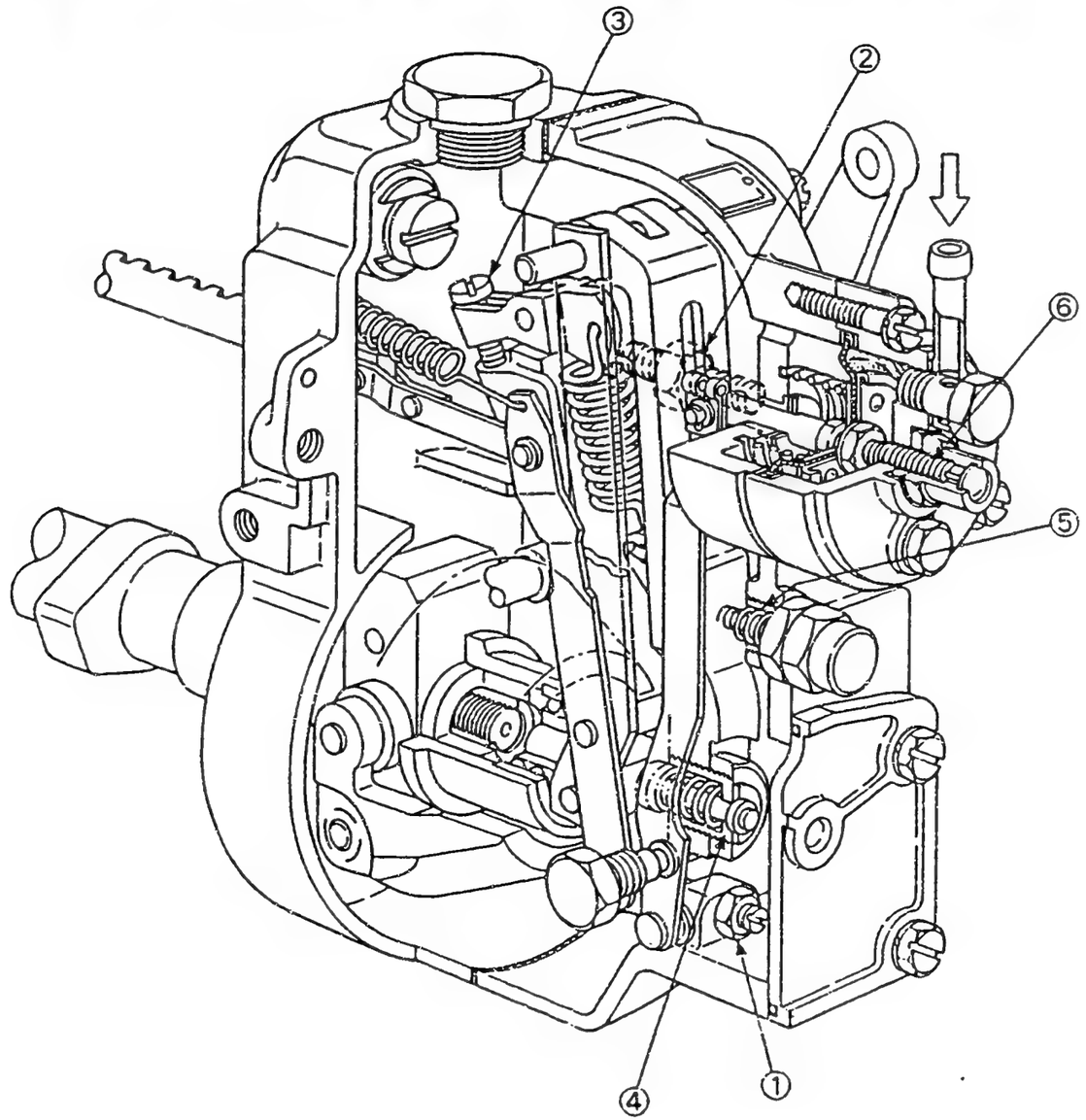


Figure 99
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule
6 = Screw

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 225	1/4
ZEXEL No.	:	106672-4591	
Date	:	31.10.1992	[4]
Company	:	KOMATSU	
Engine	:	SA6D155 / 6128-71-1084	

IP-Type number	:	106067-8151 / PES6PD
Governor type number	:	105448-9362 / EP/RSUV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	0 681 343 002
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm	:	2.5 ± 0.05
Rod position mm	:	-.
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

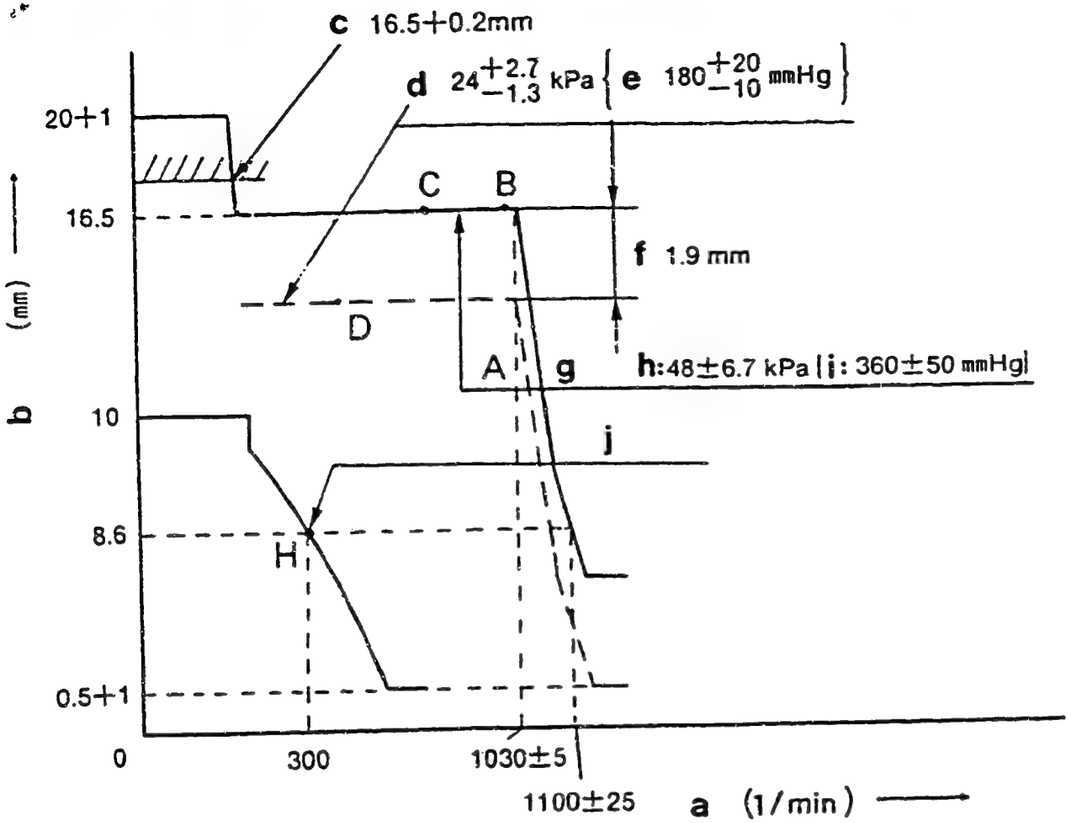
Continued (Test values)

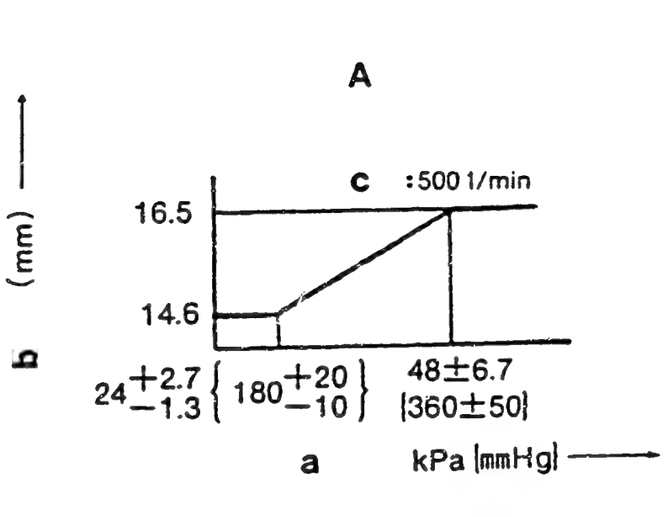
Injection Quantity :

Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	14.3	1000	250.0 ± 5.0	-	Rack	Basic Each cylinder
H	8.6	300	28.0 ± 3.0	± 10.0	Rack	
A	14.3	1000	250.0 ± 5.0	-	Lever	Basic Each cylinder
B	16.5	1000	335.0 ± 2.0	-	Lever	Boost pressure kPa (mmHg) above 48±6.7 (above 360±50)
C	16.5	700	315.0 ± 5.0	-	Lever	Boost pressure kPa (mmHg) above 48±6.7 (above 360±50)
D	14.6	400	254.0 ± 5.0	-	Lever	

Timing Advance Specification :

Pump Speed (rpm)					
Advance Angle (deg)					





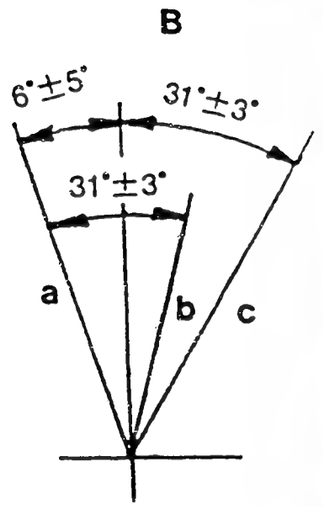


Figure 100 GOVERNOR ADJUSTMENT

Recommended speed droop adjustment screw position: 10 106672-4591 2/4
Perform torque control spring adjustment when necessary

a = Pump speed
b = Control rack position
c = Control rack limit setting:
d = Boost pressure: e = below:
f = Boost compensator stroke:
g = Boost pressure: h/i = above:
j = Idle setting
(Using boost pressure 0)

A = BOOST COMPENSATOR ADJUSTMENT
a = Boost pressure
b = Control rack position
c = Pump speed:

B = Speed Control Lever Angle
a = Full-speed
b = Idling
c = Stop

Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

ADJUSTMENT

		Pump Speed (rpm)	Rack Position (mm)	Boost pressure kPa (mmHg)	Remarks
Full-load Adjustment (Temporary)		1230 700	16.5 16.5	0 0	• Adjust using screw (2) • Adjust using screw (1)
Torque Control Spring Adjustment	**1.st stroke**	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
	2.st stroke	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Maximum Speed Adjustment		1030 ± 5 1100 ± 25	16.5 8.6	-	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Boost Compensator System		500 500	14.6 16.5	24+2.7 -1.3 (180+20) -10 48 ± 6.7 (360 ± 50)	• Fix the control lever • Adjust using screw (6) • Confirm the boost compensator stroke is: 1.9 mm
Idling Adjustment 1. Idling Sub Spring	**H**	0 300 above 500	10.0 8.6 0.5 ± 1	0 0 0	• Fix the control lever • Adjust using spring capsule (5) • Confirm
2. Control Lever		-	-	-	• Adjust using the control lever
Full-load Adjustment		1100	16.5	above 48 ± 6.7 (360 ± 50)	• Confirm
Control Lever Angle Measurement		• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.			
Control Rack Limiter Adjustment		-	16.5	-	• Adjust using screw

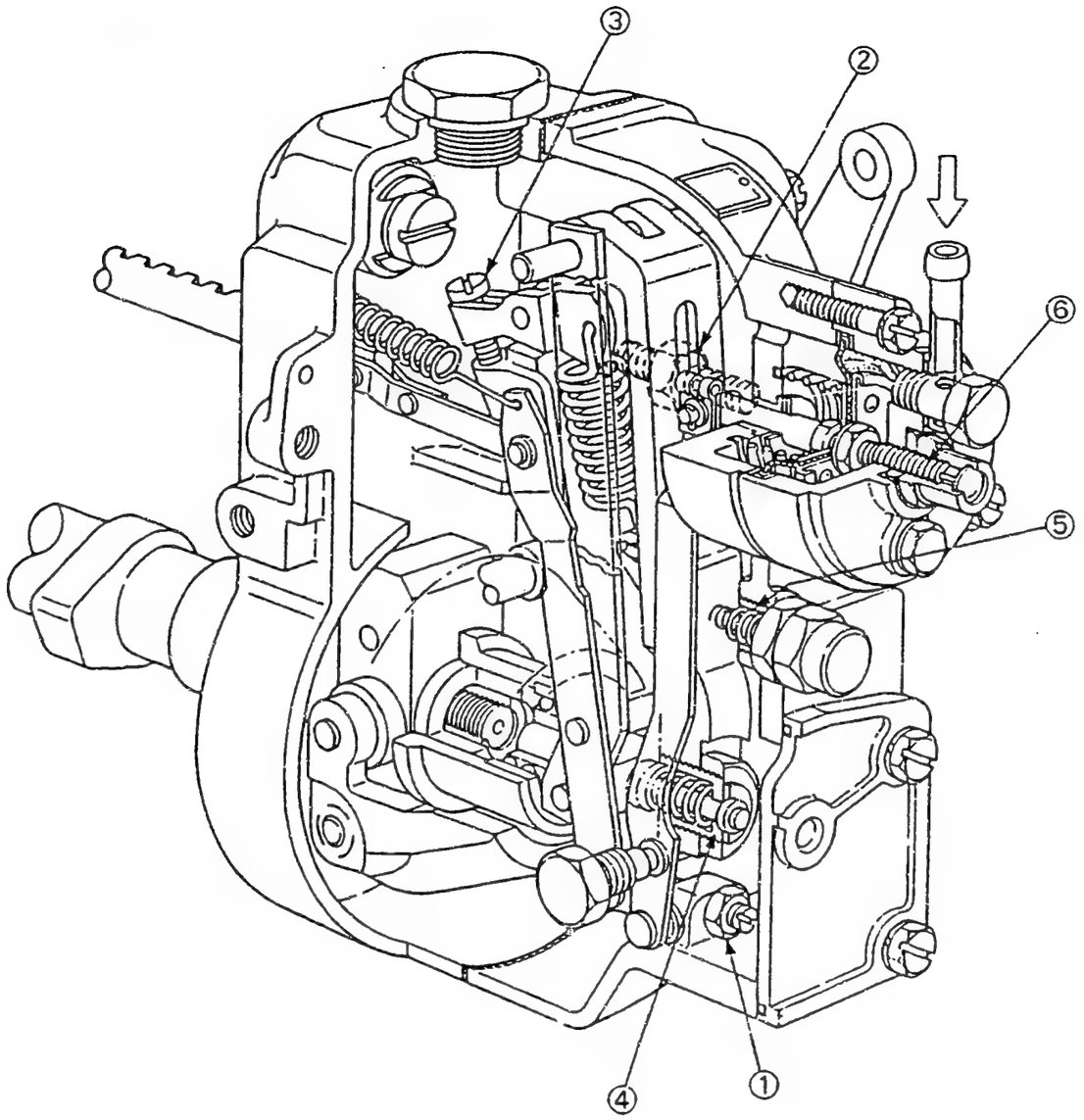


Figure 101
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule
6 = Screw

106672-4591 4/4

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	: 9 400 610 226	1/4
ZEXEL No.	: 106672-9124	
Date	: 31.10.1992	[2]
Company	: KOMATSU	
Engine	: SA6D125 / 6152-71-1191	

IP-Type number	:	106060-5712 / PE 6P
Governor type number	:	105407-3051 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	0 681 343 002
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm	:	3.8 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

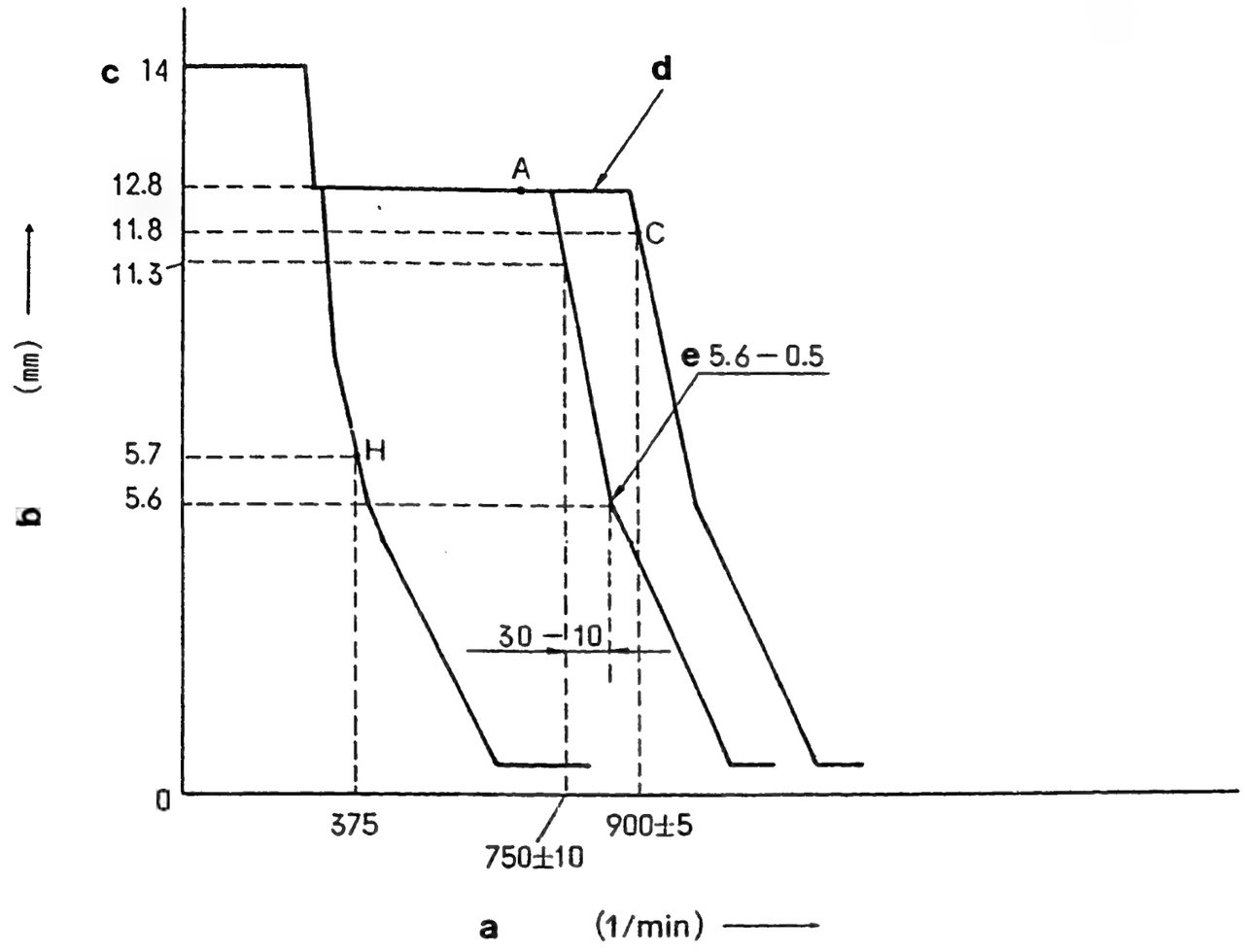
Continued (Test values)

Injection Quantity :

Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	12.8	700	305.4 ± 2.0	± 3.0	Lever	Basic
H	approx. 5.7	375	14.6 ± 1.5	± 15.0	Rack	
A	12.8	700	305.4 ± 2.0	-	Lever	Basic
C	11.8	900	(264.7)	-	Lever	

Timing Advance Specification :

Pump Speed (rpm)						
Advance Angle (deg)						



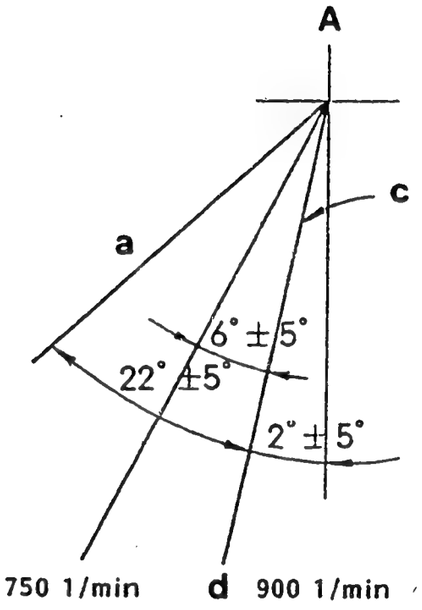


Figure 102

GOVERNOR ADJUSTMENT
Recommended speed droop adjustment screw position: 12

106672-9124 2/4

a = Pump speed
b = Control rack position
c = Above
d = Perform torque control spring adjustment when necessary
e = Idle-sub spring setting:

A = Speed Control Lever Angle

a = Idling
b = Setting:
c = Full-speed
d = Setting:
(on our shipment)

■ Note
- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-load Adjustment (Temporary)	1100 600	12.8 12.8	• Adjust using screw (2) • Adjust using screw (1)
Torque Control spring Adjustment	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Idling Adjustment	750^{+30}_{+20} 375	5.6 -0.5 5.7	• Fix the control lever • Adjust using spring capsule (5) • Adjust using control lever
Maximum-speed Adjustment	750 ± 10 750^{+30}_{+20} 900 ± 5	11.3 5.6 11.8	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm • Fix the control lever • Adjust using screw (3)
Full-load Adjustment	850	12.8	• Confirm
Control Lever Angle Measurement	• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.		
Rack Limiter Adjustment	-	-	• Adjust using screw

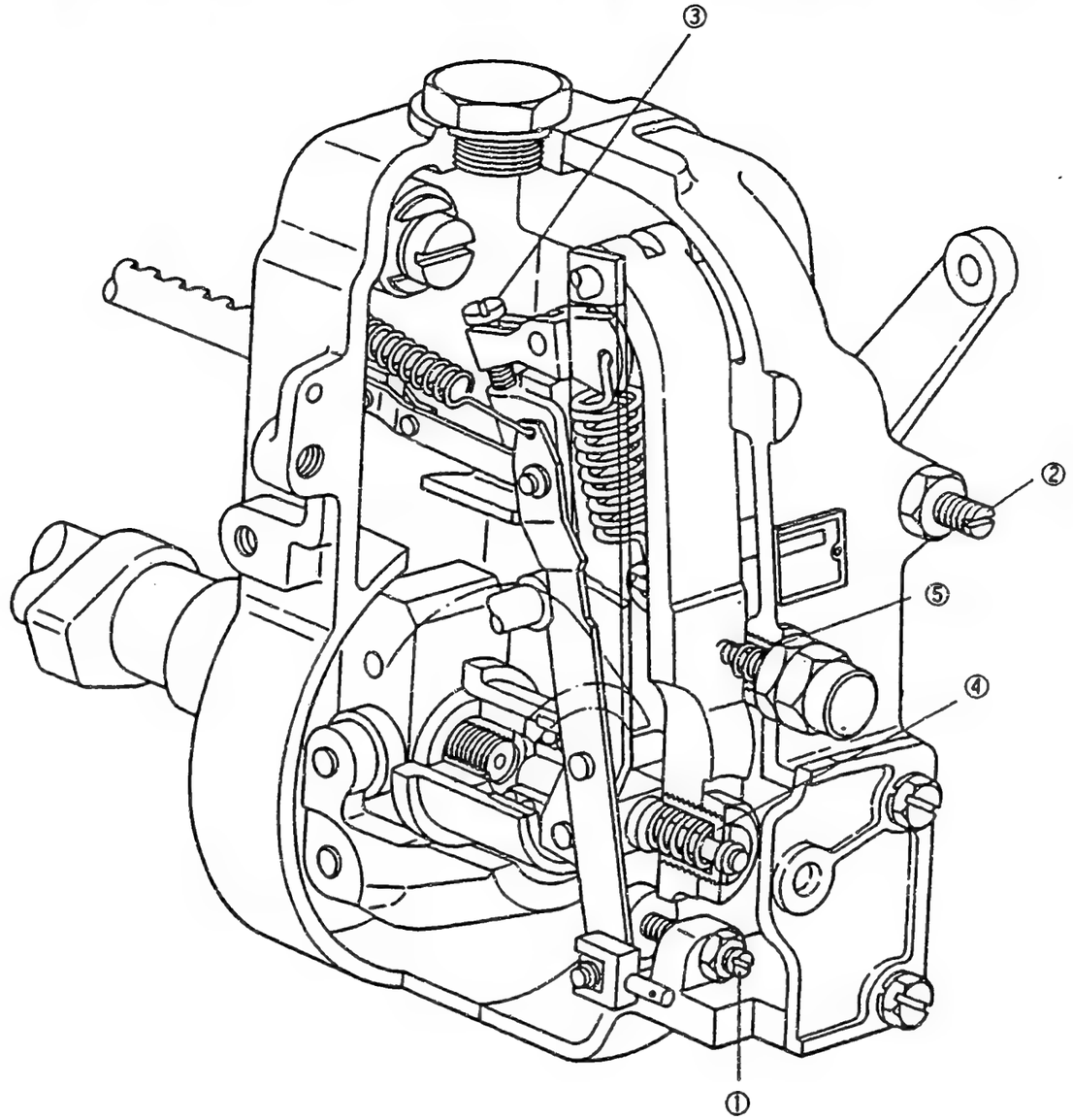


Figure 103
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule

106672-9124 4/4

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 227	1/4
ZEXEL No.	:	106672-9183	
Date	:	31.10.1992	[3]
Company	:	KOMATSU	
Engine	:	S6D140 / 6211-71-1311	

IP-Type number	:	106060-5451 / PE6P
Governor type number	:	105407-2901 / EP/RSV

TEST PREREQUISITES

Test oil		:	ISO-4113
Test oil inlet temperature	°C	:	40.00...45.00
Inlet pressure	bar	:	1.6
Test nozzle holder combination		:	1 688 901 013
Opening pressure	bar	:	175
Test pressure line			
Inner x Outer Dia - Length	mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke	mm	:	4.3 ± 0.05
Rod position	mm	:	-
Port closing mark Cyl. No.		:	-
Cam sequence		:	1-5-3-6-2-4
Port closing mark Cyl. No.		:	-
Port closing difference	°NW	:	0-60-120-180-240-300
Tolerance	+- °C	:	0.50 (0.75)

Continued (Test values)

Injection Quantity :

Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	8.3	1050	133.9 ± 2.0	± 3.0	Lever	Basic
H	approx. 3.5	365	11.5 ± 1.5	± 15.0	Rack	
A	8.3	1050	133.9 ± 2.0	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)						
Advance Angle (deg)						

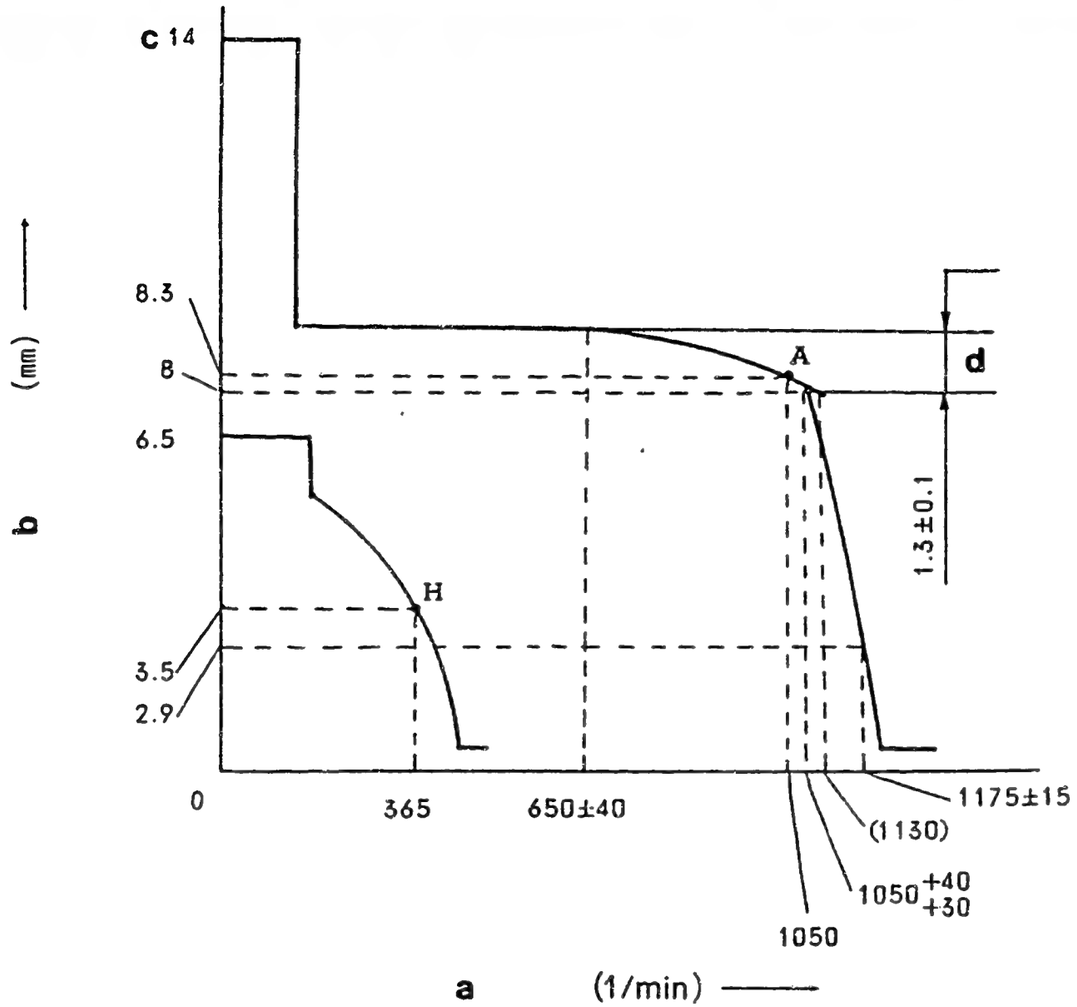
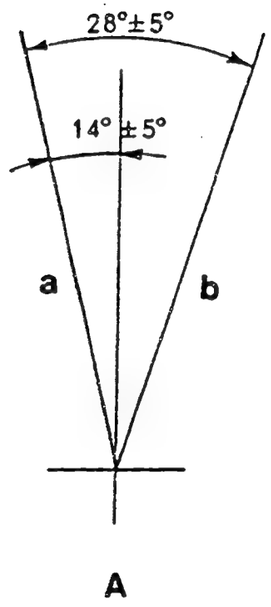


Figure 104

a = Pump speed
b = Control rack position
c = Above
d = Difference in control rack position between 1200 rpm and 600 rpm



GOVERNOR ADJUSTMENT 106672-9183 2/4

Recommended speed droop adjustment screw position: 16

A = Speed Control Lever Angle

a = Full-speed
b = Idling

■ Note
- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-load Adjustment (Temporary)	1200 700	8.0 8.0	• Adjust using screw (2) • Adjust using screw (1)
Torque Control spring Adjustment	550 650 ± 40 1050 approx. 1130	9.3 9.3 8.3 8.0	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is 1.3 ± 0.1 mm
Idling Adjustment	0 365	6.5 3.5	• Fix the control lever • Adjust using spring capsule (5) • Confirm
Maximum-speed Adjustment	1050+40 +30 1175 ± 15	8.0 2.9	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Full-load Adjustment	-	-	• Confirm
Control Lever Angle Measurement	• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.		
Rack Limiter Adjustment	-	-	• Adjust using screw

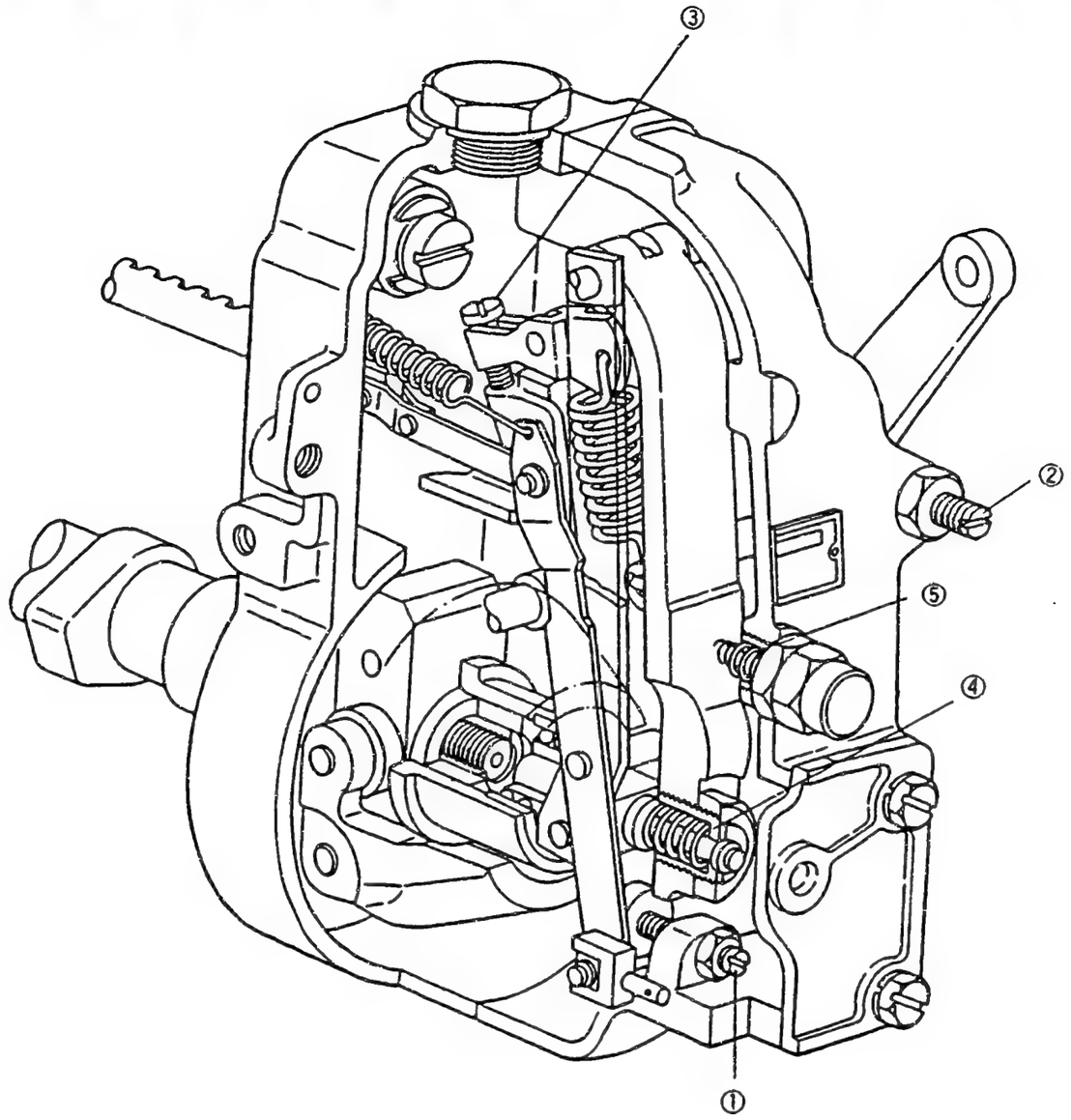


Figure 105
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule

106672-9183 4/4

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 228	1/4
ZEXEL No.	:	106672-9562	
Date	:	31.10.1992	[1]
Company	:	KOMATSU	
Engine	:	S6D140 / 6211-71-1660	

IP-Type number	:	106060-7070 / PE 6P
Governor type number	:	105447-1250 / EP/RSUV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	0 681 343 002
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm	:	4.3 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

Continued (Test values)

Injection Quantity :

Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	11.7	900	268.6 ± 4.0	± 3.0	Lever	Basic
H	approx. 5.8	400	20.7 ± 1.5	± 15.0	Rack	
A	11.7	900	268.6 ± 4.0	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)						
Advance Angle (deg)						

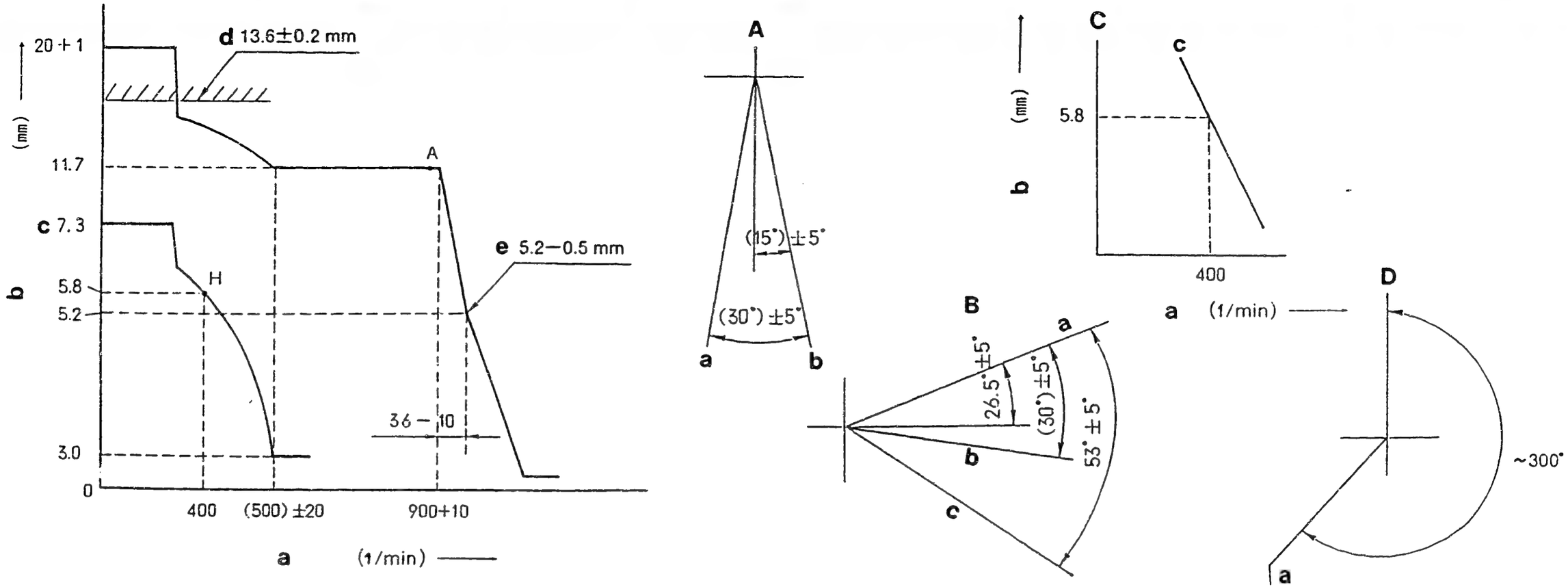


Figure 106

Minimum-Maximum Speed Specification

a = Pump speed
b = Control rack position
c = Above
d = Control rack limit:
e = Idle-sub spring setting:

GOVERNOR ADJUSTMENT
Recommended speed droop adjustment screw position: 17

106672-9562 2/4

A = Speed Control Lever Angle

a = Idling
b = Full-speed

B = Load-Control Lever Angle

a = Full-load
b = Idling
c = Stop

C = Variable Speed Specification

a = Pump speed
b = Control rack position
c = Idle setting

D = TIMING SETTING

At No. 1 plunger's beginning of injection position.

a = Coupling key groove position

■ Note
- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

		Pump Speed (rpm)	Rack Position (mm)	Boost pressure kPa (mmHg)	Remarks
Full-load Adjustment (Temporary)		1100 700	11.7 11.7	-	• Adjust using screw (2) • Adjust using screw (1)
Torque Control Spring Adjustment	**1.st stroke**	approx. 500	11.7	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
	2.st stroke	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Maximum-speed Adjustment		900 + 10 900+36 +26	11.7 5.2	-	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Boost Compensator System		-	-	-	• Fix the control lever • Adjust using screw (6) • Confirm the boost compensator stroke is: (mm)
Idling Adjustment 1. Idling Sub Spring		0 900+36 +26 above 550	7.3 5.2 3.0	-	• Fix the control lever • Adjust using spring capsule (5) • Confirm
2. Control Lever	**H**	400	5.8	-	• Adjust using the control lever
Full-load Adjustment		-	-	-	• Confirm
Control Lever Angle Measurement		• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.			
Control Rack Limiter Adjustment		0	13.6 ± 0.2	-	• Adjust using screw

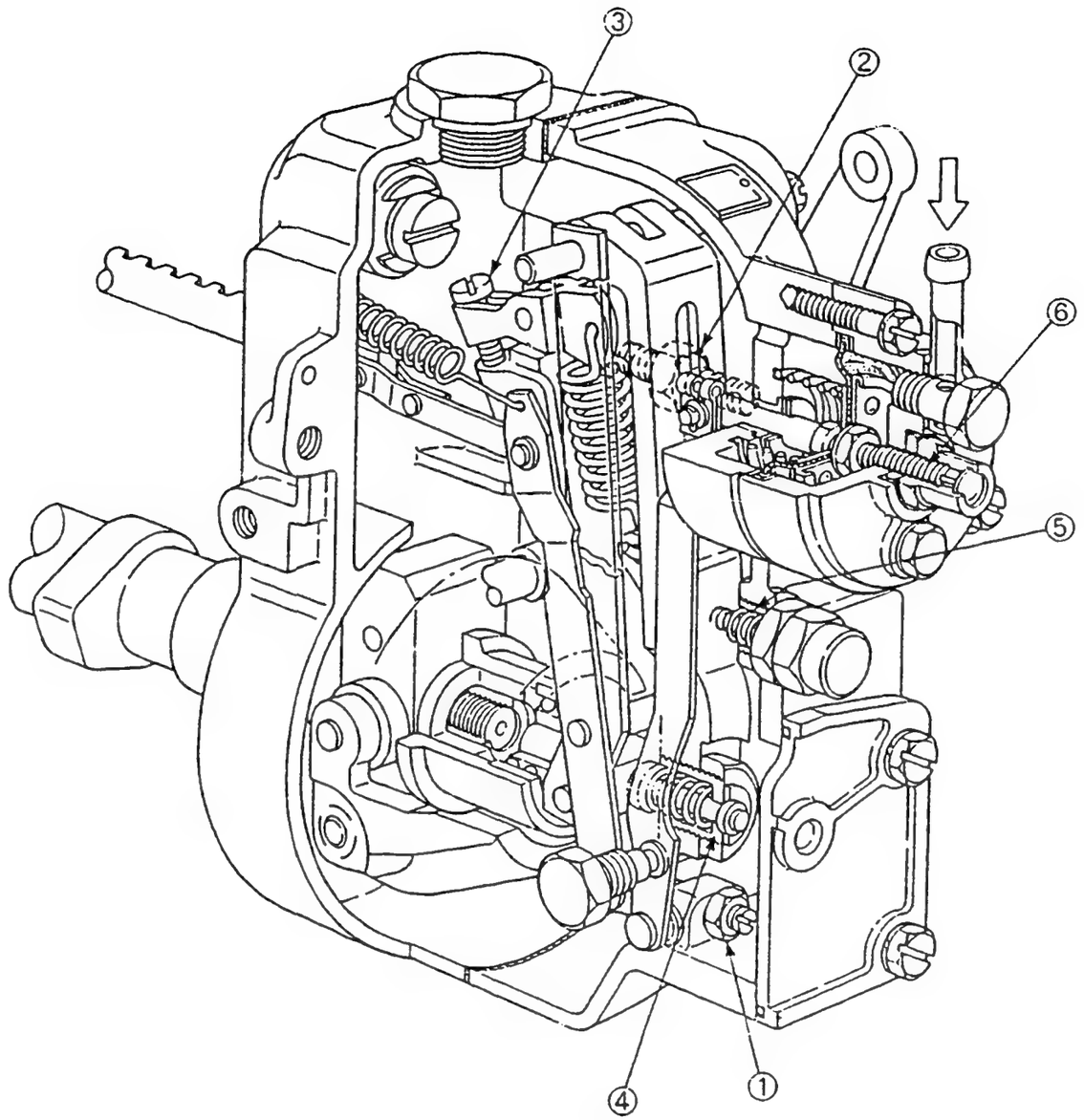


Figure 107
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule
6 = Screw

106672-9562 4/4

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 230	1/4
ZEXEL No.	:	106692-4123	
Date	:	31.10.1992	[4]
Company	:	KOMATSU	
Engine	:	SA6D170 / 6162-73-1253	

IP-Type number	:	106069-8031 / PES6PD
Governor type number	:	105448-9502 / EP/RSUV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	0 681 343 002
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm	:	2.4 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

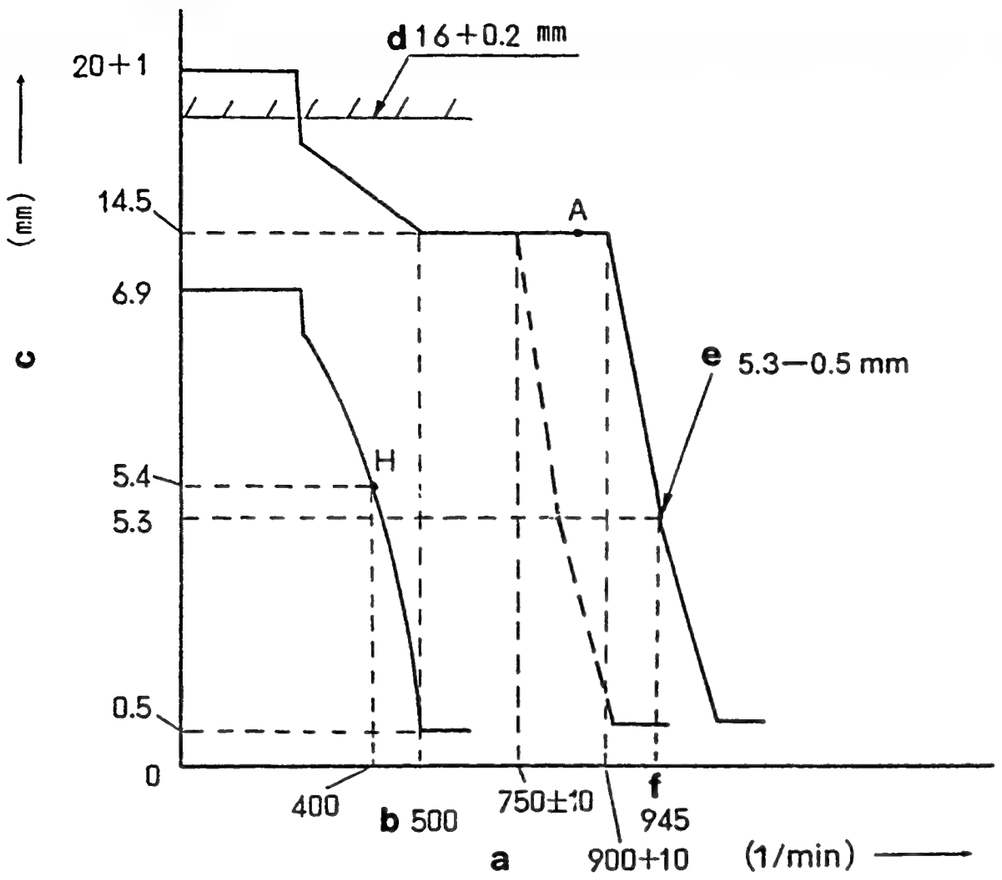
Continued (Test values)

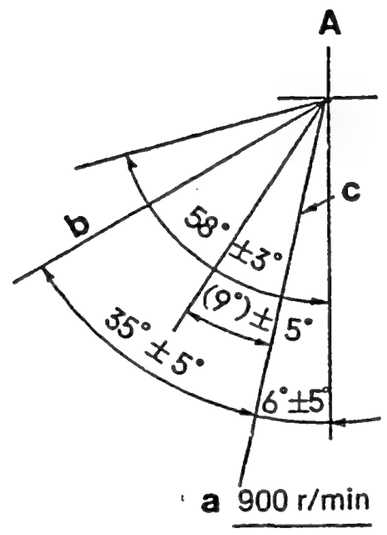
Injection Quantity :

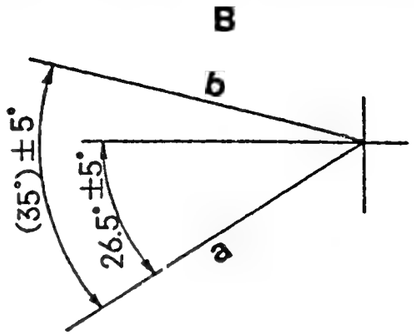
Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	14.5	900	472.5 ± 5.0	-	Lever	Basic
H	approx. 5.4	400	39.5 ± 5.0	± 10	Rack	
A	14.5	900	472.5 ± 5.0	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)						
Advance Angle (deg)						







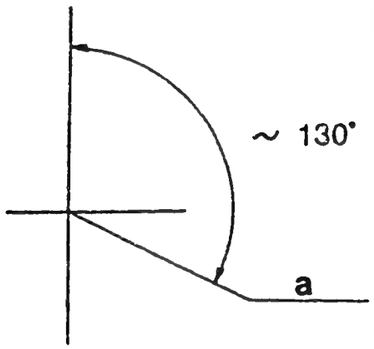


Figure 108

a = Pump speed
b = Above
c = Control rack position
d = Above
e = Control rack limit:
f = dle-sub spring setting:
g = Below

GOVERNOR ADJUSTMENT
Recommended speed droop adjustment screw position: 13

A = Control Lever Angle
a = Setting:
(on our shipment)
b = Idling
c = Full-speed

B = STOP LEVER ANGLE
a = Full-load
b = Idling

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■ TIMING SETTING

At No. 1 plunger's beginning of injection position.

a = Gear coupling's aligning mark position (on key groove)

■ Note
- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

		Pump Speed (rpm)	Rack Position (mm)	Boost pressure kPa (mmHg)	Remarks
Full-load Adjustment (Temporary)		1100 700	14.5 14.5	-	• Adjust using screw (2) • Adjust using screw (1)
Torque Control Spring Adjustment	**1.st stroke**	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
	2.st stroke	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Maximum-speed Adjustment		900 ± 10 below 945	14.5 5.3	-	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Boost Compensator System		-	-	-	• Fix the control lever • Adjust using screw (6) • Confirm the boost compensator stroke is: (mm)
Idling Adjustment 1. Idling Sub Spring		below 945	5.3 -0.5	-	• Fix the control lever • Adjust using spring capsule (5) • Confirm
2. Control Lever	**H**	0 400 above 500	above 6.9 5.4 0.5	-	• Adjust using the control lever • Confirm
Full-load Adjustment		900	14.5	-	• Confirm
Control Lever Angle Measurement		• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.			
Control Rack Limiter Adjustment		0	16 + 0.2	-	• Adjust using screw

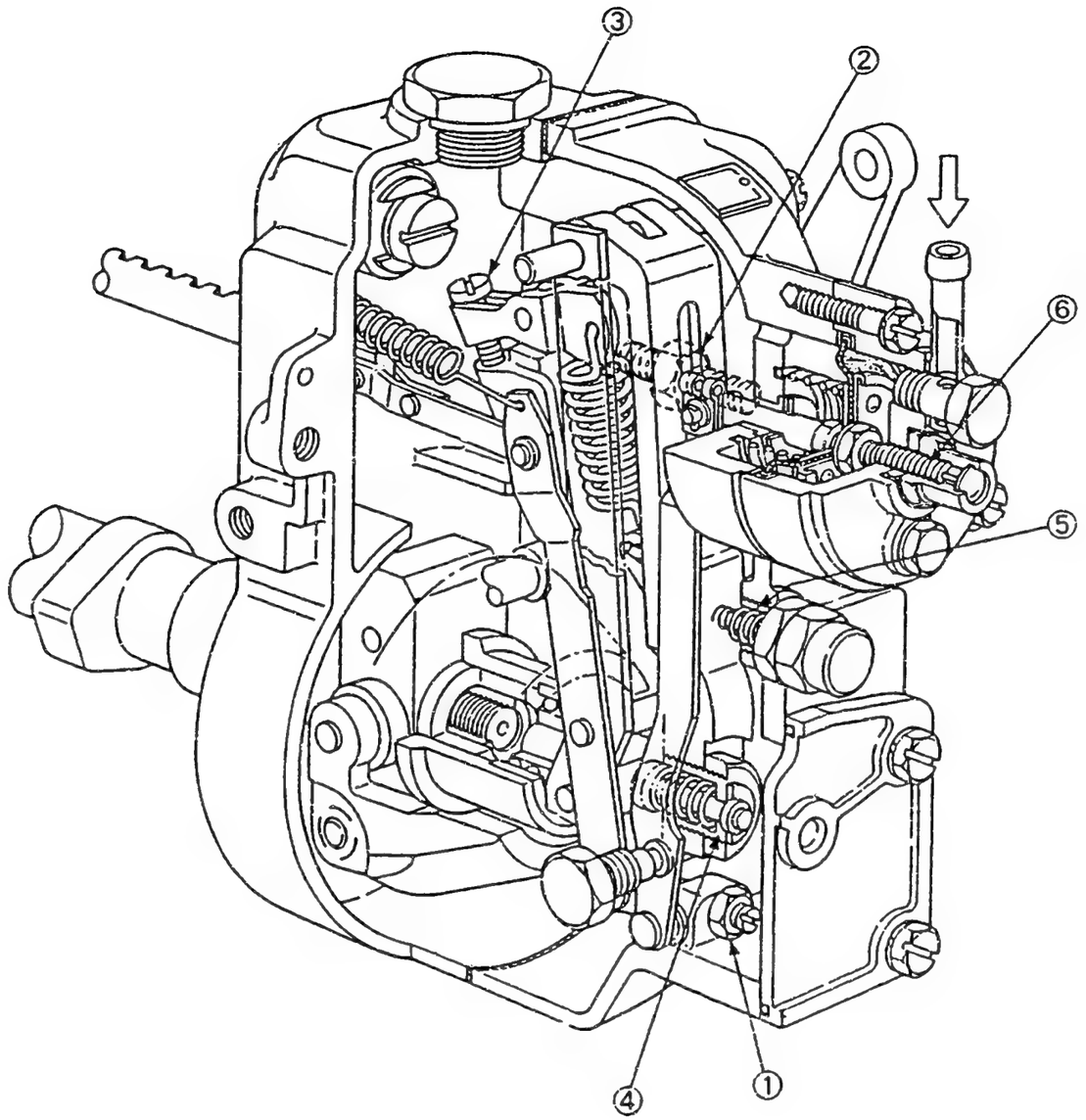


Figure 109
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule
6 = Screw

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 231	1/4
ZEXEL No.	:	106692-4323	
Date	:	31.10.1992	[5]
Company	:	KOMATSU	
Engine	:	S6D125 / 6151-71-1220	

IP-Type number	:	106069-5540 / PE 6P
Governor type number	:	105407-2822 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm	:	3.75 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

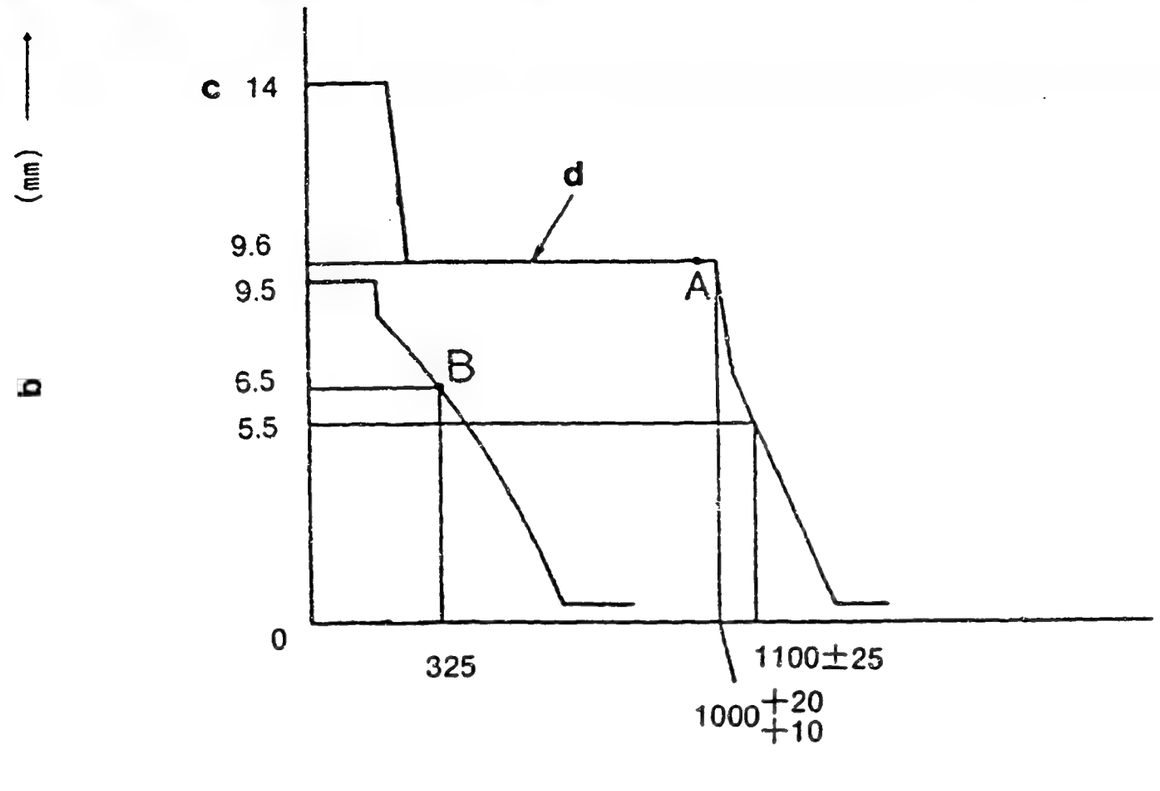
Continued (Test values)

Injection Quantity :

Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	9.6	1000	141.8 ± 2.0	± 3	Lever	Basic
H	approx. 6.5	325	11.0 ± 1.5	± 15	Rack	
A	9.6	1000	141.8 ± 2.0	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)						
Advance Angle (deg)						



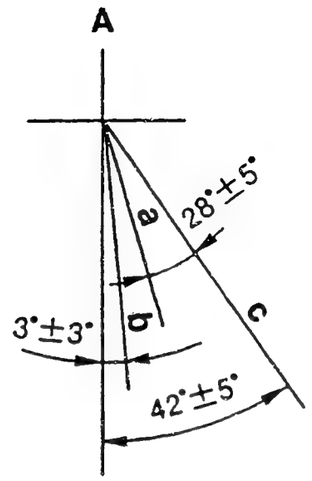


Figure 110

a = Pump speed
b = Control rack position
c = Above
d = Perform torque control spring adjustment when necessary

Recommended speed droop adjustment screw position: 16

A = Speed Control Lever Angle
a = Idling
b = Stop
c = Full-speed

■ Note
- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-load Adjustment (Temporary)	1200 700	9.6 9.6	• Adjust using screw (2) • Adjust using screw (1)
Torque Control spring Adjustment	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Idling Adjustment	0 325	9.5 6.5	• Fix the control lever • Adjust using spring capsule (5) • Confirm
Maximum-speed Adjustment	1000^{+20}_{+10} 1100±25	9.6 5.5	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Full-load Adjustment	1000	9.6	• Confirm
Control Lever Angle Measurement	• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.		
Rack Limiter Adjustment	-	-	• Adjust using screw

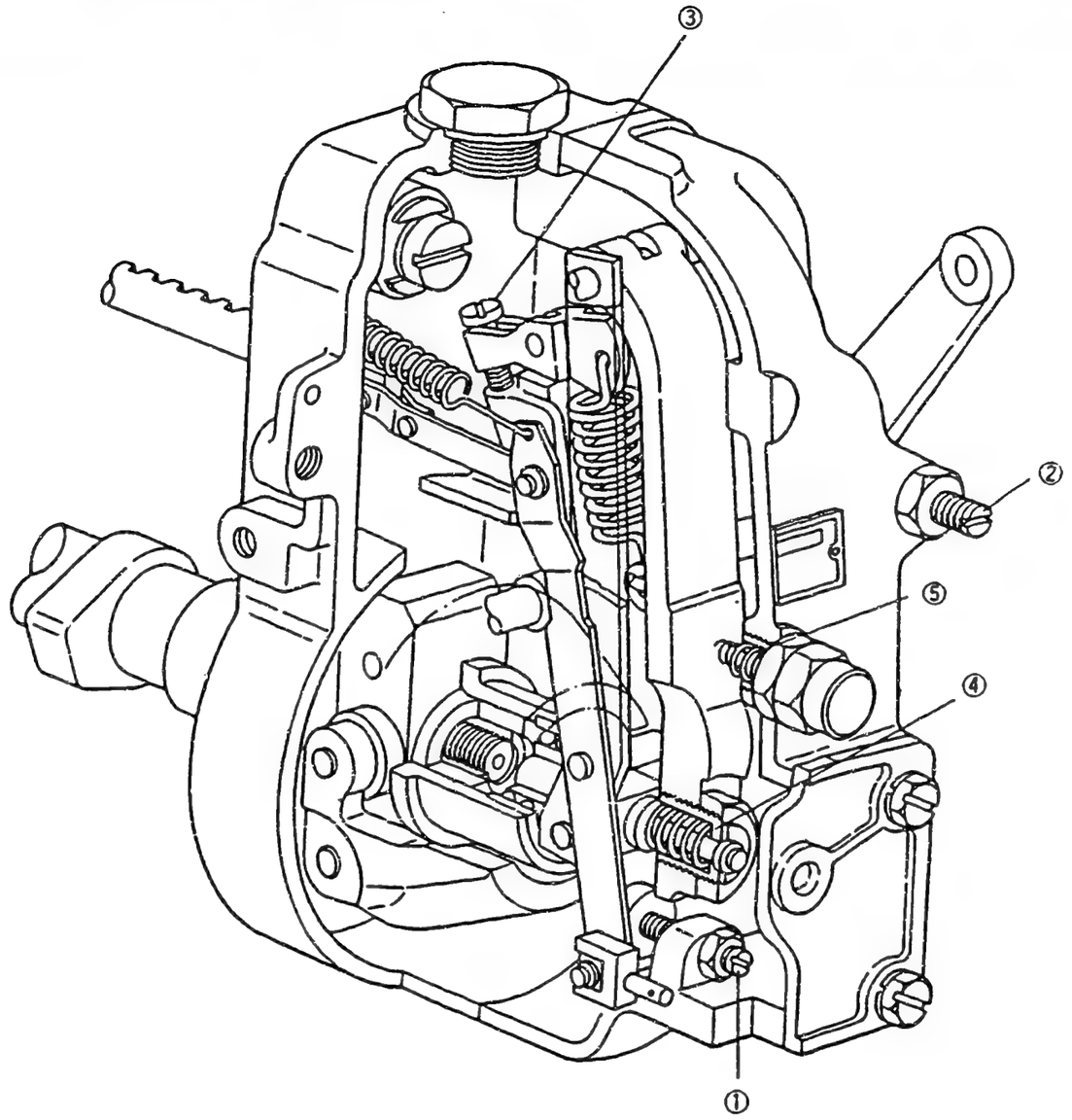


Figure 111
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 234	1/4
ZEXEL No.	:	106692-4403	
Date	:	31.10.1992	[0]
Company	:	KOMATSU	
Engine	:	S6D125 / 6151-71-1112	

IP-Type number	:	106069-5420 / PE 6P
Governor type number	:	105407-2961 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm	:	3.75 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

Continued (Test values)

Injection Quantity :

Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	9.1	1100	120.8 ± 2.0	± 3.0	Lever	Basic
H	approx. 6.5	350	12.3 ± 1.5	± 15.0	Rack	
A	9.1	1100	120.8 ± 2.0	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)					
Advance Angle (deg)					

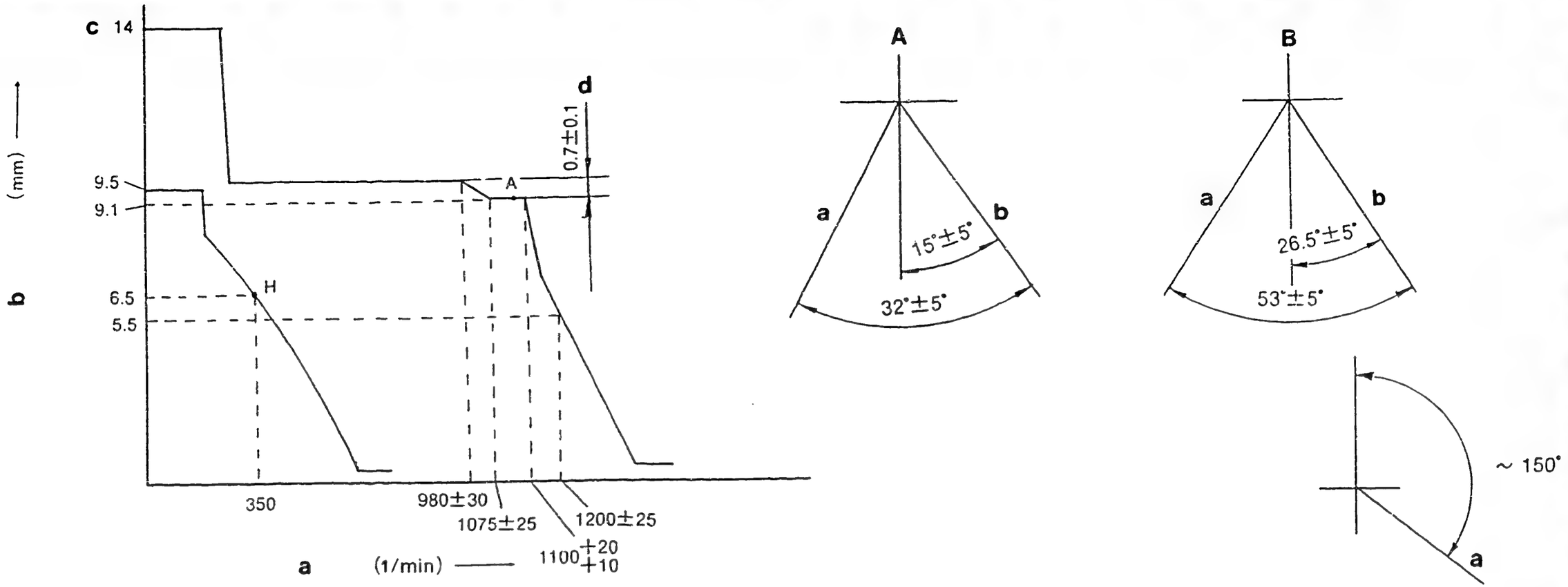


Figure 112

a = Pump speed
b = Control rack position
c = Above
d = Difference in control rack position between 1100 rpm and 700 rpm

GOVERNOR ADJUSTMENT 106692-4403 2/4

Recommended speed droop adjustment screw position: 17

A = Speed Control Lever Angle
a = Idling
b = Full-speed

B = Stop Lever Angle
a = Stop
b = Normal

TIMING SETTING

At No. 1 plunger's beginning of injection position.

a = Coupling key groove position

Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

ADJUSTMENT

		Pump Speed (rpm)	Rack Position (mm)	Boost pressure kPa (mmHg)	Remarks
Full-load Adjustment (Temporary)		1300 700	9.1 9.1	-	• Adjust using screw (2) • Adjust using screw (1)
Torque Control Spring Adjustment	**1.st stroke**	880 980 ± 30 1075 ± 25	9.8 9.8 9.1	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: 0.7 ± 0.1 mm
	2.st stroke	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Maximum Speed Adjustment		1100+20 +10 1200±25	9.1 5.5	-	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Boost Compensator System		-	-	-	• Fix the control lever • Adjust using screw (6) • Confirm the boost compensator stroke is: (mm)
Idling Adjustment 1. Idling Sub Spring	**H**	0 365	9.5 6.5	-	• Adjust using the control lever • Adjust using spring capsule (5) • Confirm
2. Control Lever		-	-	-	• Adjust using the control lever
Full-load Adjustment		1100	9.1	-	• Confirm
Control Lever Angle Measurement		• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.			
Control Rack Limiter Adjustment		-	-		• Adjust using screw

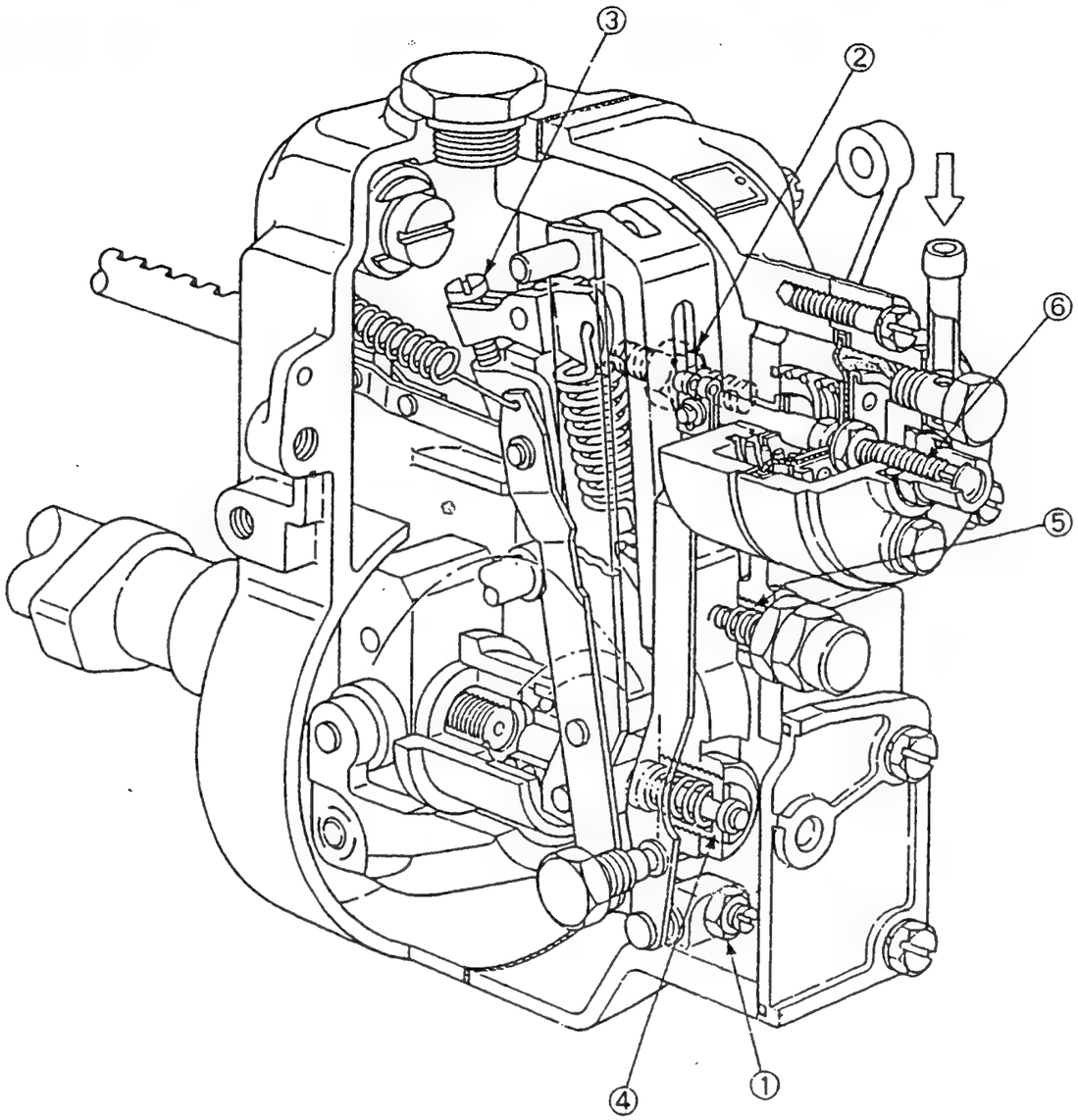


Figure 113
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule
6 = Screw

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ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 235	1/4
ZEXEL No.	:	106692-4593	
Date	:	31.10.1992	[0]
Company	:	KOMATSU	
Engine	:	S6D125 / 6151-71-1410	

IP-Type number	:	106069-5420 / PE 6P
Governor type number	:	105407-3363 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm	:	3.75 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

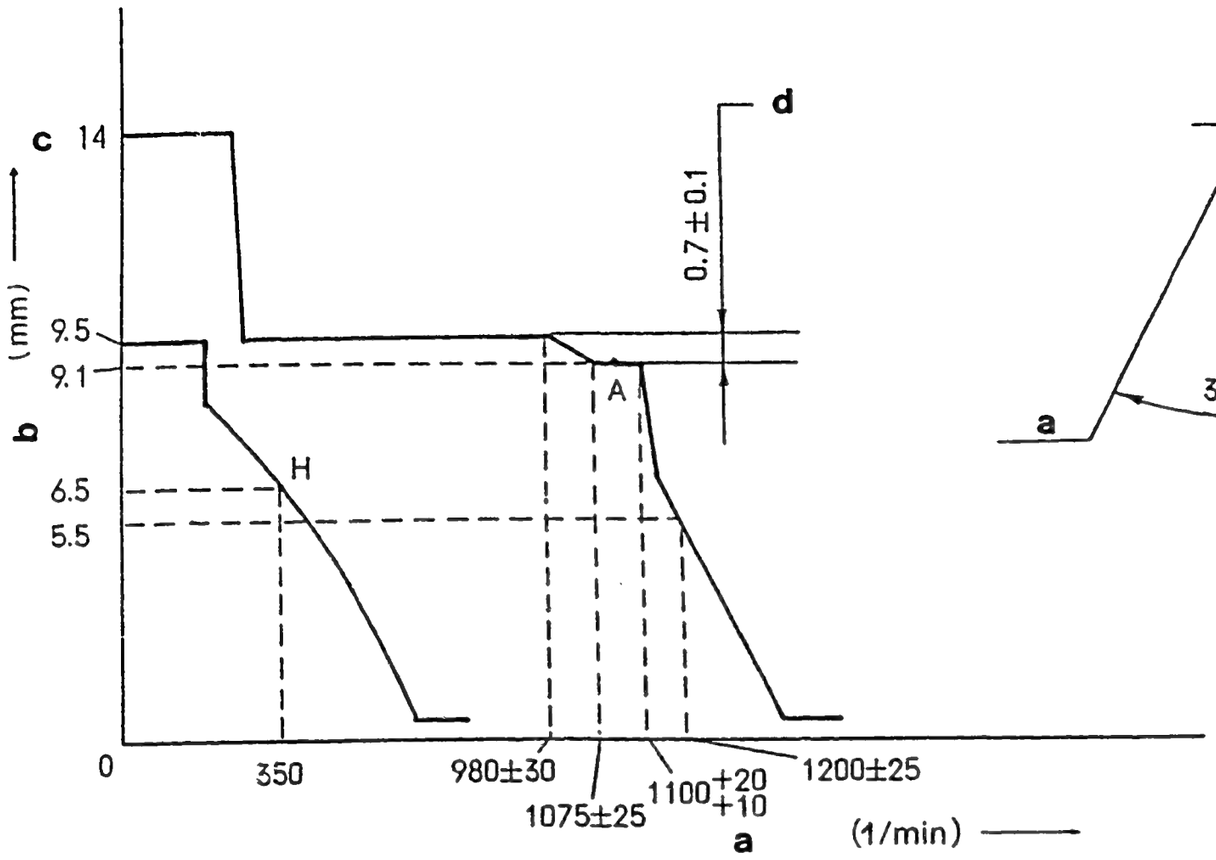
Continued (Test values)

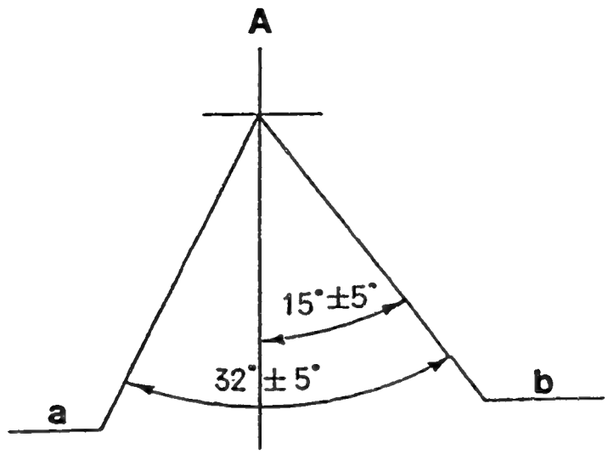
Injection Quantity :

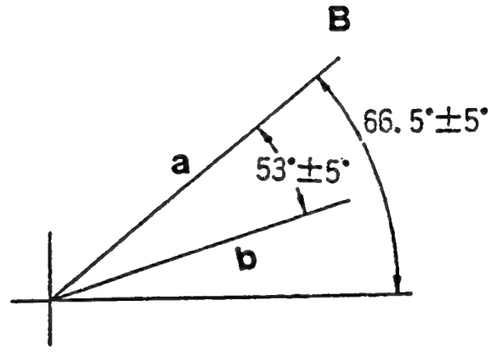
Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	9.1	1100	120.8 ± 2.0	± 3.0	Lever	Basic
H	approx. 6.5	350	12.3 ± 1.5	± 15.0	Rack	
A	9.1	1100	120.8 ± 2.0	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)					
Advance Angle (deg)					







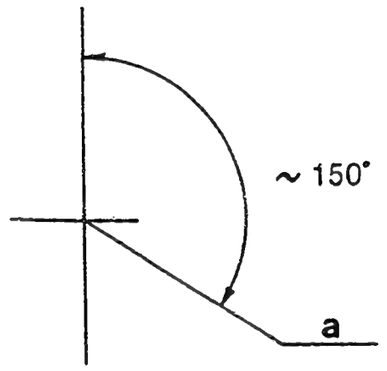


Figure 114

a = Pump speed
b = Control rack position
c = Above
d = Difference in control rack position between 1100 rpm and 700 rpm

GOVERNOR ADJUSTMENT

106692-4593 2/4

Recommended speed droop adjustment screw position: 17

A = Speed Control Lever Angle
a = Idling
b = Full-speed

B = Stop Lever Angle
a = Normal
b = Stop

TIMING SETTING

At No. 1 plunger's beginning of injection position.

a = Coupling key groove position

■ Note
- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-load Adjustment (Temporary)	1300 700	9.1 9.1	• Adjust using screw (2) • Adjust using screw (1)
Torque Control spring Adjustment	approx. 880 980 ± 30 1075 ± 25	9.8 9.8 9.1	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is 0.7 ± 0.1 mm
Idling Adjustment	0 350	9.5 6.5	• Fix the control lever • Adjust using spring capsule (5) • Confirm
Maximum-speed Adjustment	1100^{+20} $^{+10}$ 1200 ± 25	9.1 5.5	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Full-load Adjustment	1100	9.1	• Confirm
Control Lever Angle Measurement	• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.		
Rack Limiter Adjustment	-	-	• Adjust using screw

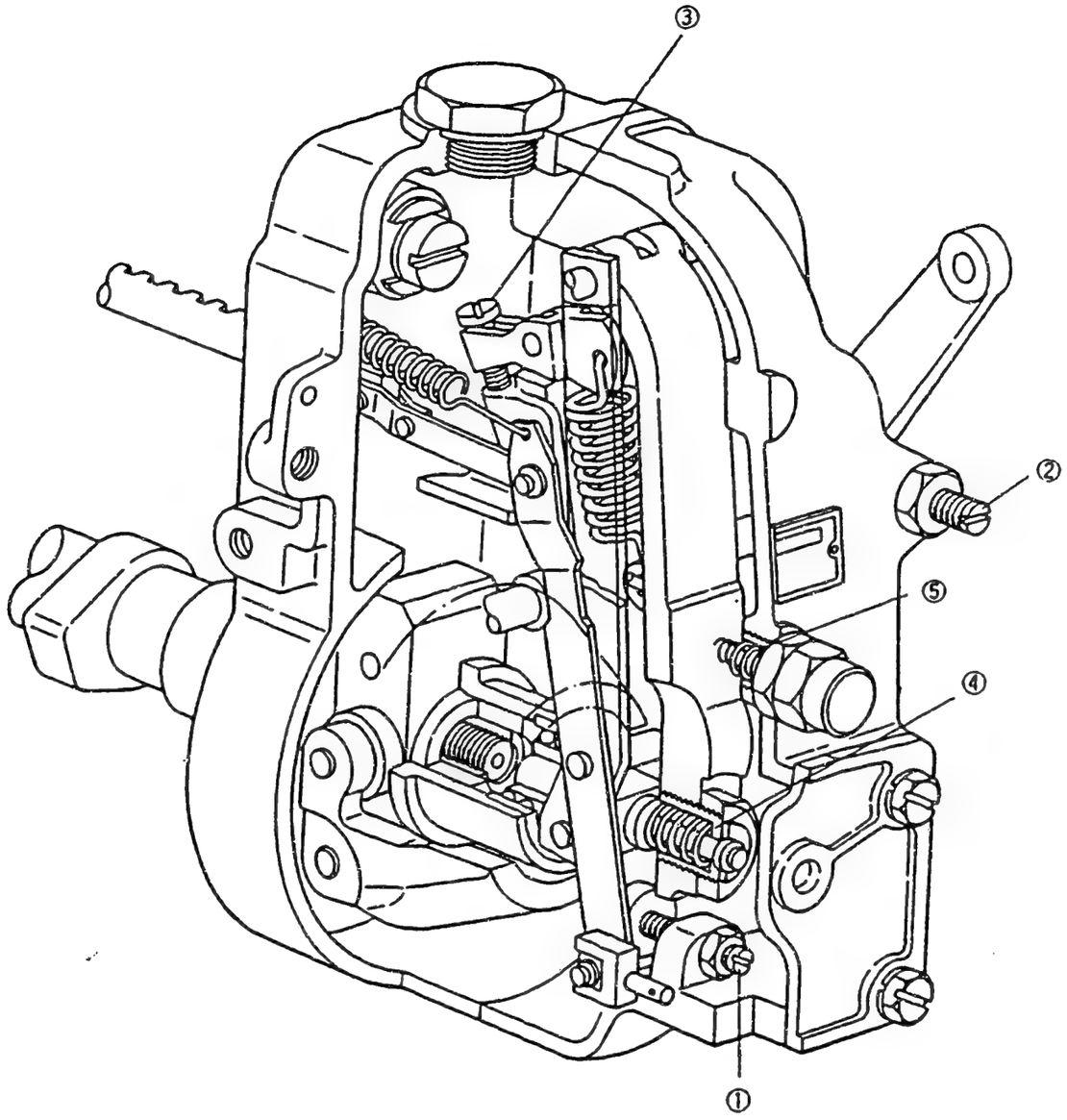


Figure 115
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule

106692-4593 4/4

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 236	1/4
ZEXEL No.	:	106692-4633	
Date	:	31.10.1992	[2]
Company	:	KOMATSU	
Engine	:	S6D125 / 6151-71-1150	

IP-Type number	:	106069-5420 / PE 6P
Governor type number	:	105407-3711 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm	:	3.75 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

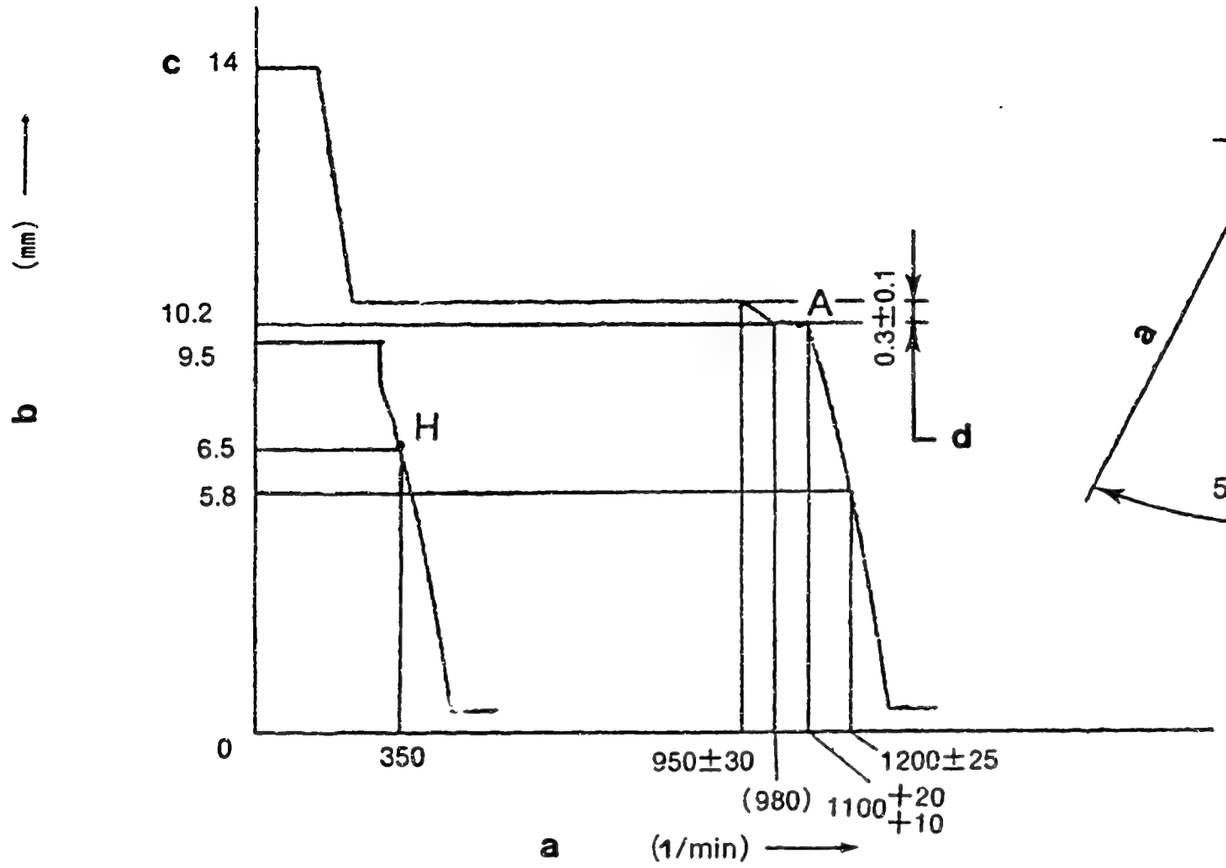
Continued (Test values)

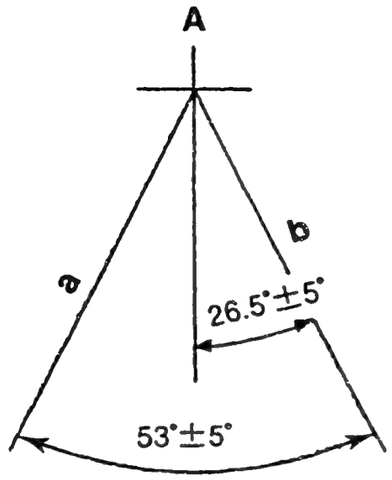
Injection Quantity :

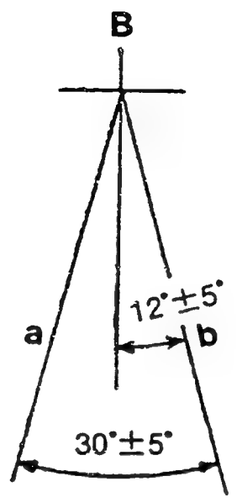
Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	10.2	1100	152.7 ± 2.0	± 3.0	Lever	Basic
H	approx. 6.5	350	12.0 ± 1.5	± 15.0	Rack	
A	10.2	1100	152.7 ± 2.0	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)					
Advance Angle (deg)					







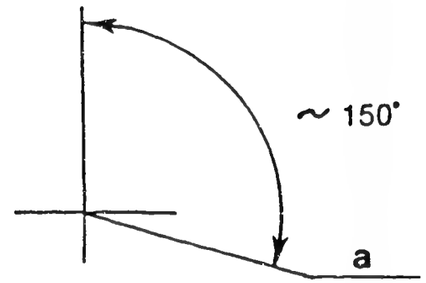


Figure 116

a = Pump speed
b = Control rack position
c = Above
d = Difference in control rack position between 1100 rpm and 700 rpm

GOVERNOR ADJUSTMENT 106692-4633 2/4
Recommended speed droop adjustment screw position: 13

A = Stop Lever Angle
a = Stop
b = Normal

B = Speed Control Lever Angle
a = Idling
b = Full-speed

■ TIMING SETTING

At No. 1 plunger's beginning of injection position.

a = Coupling key groove position

Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

ADJUSTMENT

	Pump speed (rpm)	Rack position (mm)	Remarks
Full-load Adjustment (Temporary)	1300 600	10.2 10.2	• Adjust using screw (2) • Adjust using screw (1)
Torque Control spring Adjustment	850 950 980	10.5 10.5 10.2	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is 0.3 ± 0.1 mm
Idling Adjustment	0 350 -	9.5 6.5 -	• Fix the control lever • Adjust using spring capsule (5) • Confirm
Maximum-speed Adjustment	1100^{+20}_{+10} 1200 ± 25	10.2 5.8	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Full-load Adjustment	1100	10.2	• Confirm
Control Lever Angle Measurement	• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.		
Rack Limiter Adjustment	-	-	• Adjust using screw

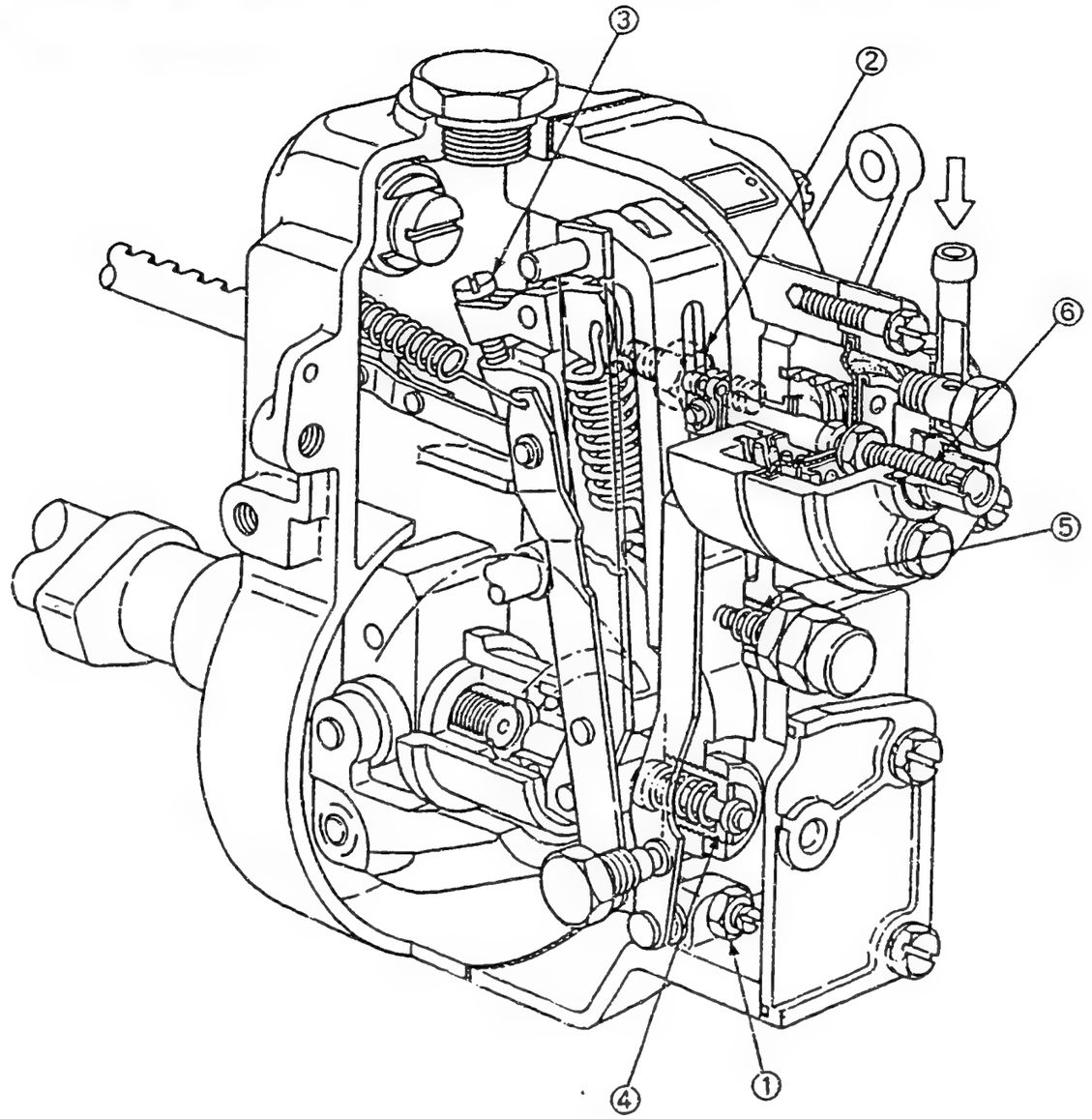


Figure 117
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule

106692-4633 4/4

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 237	1/4
ZEXEL No.	:	106692-4741	
Date	:	31.10.1992	[0]
Company	:	KOMATSU	
Engine	:	S6D170 / 6162-73-1582	

IP-Type number	:	106069-8060 / PES6PD
Governor type number	:	105448-9721 / EP/RSUV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	0 681 343 002
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm	:	2.4 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

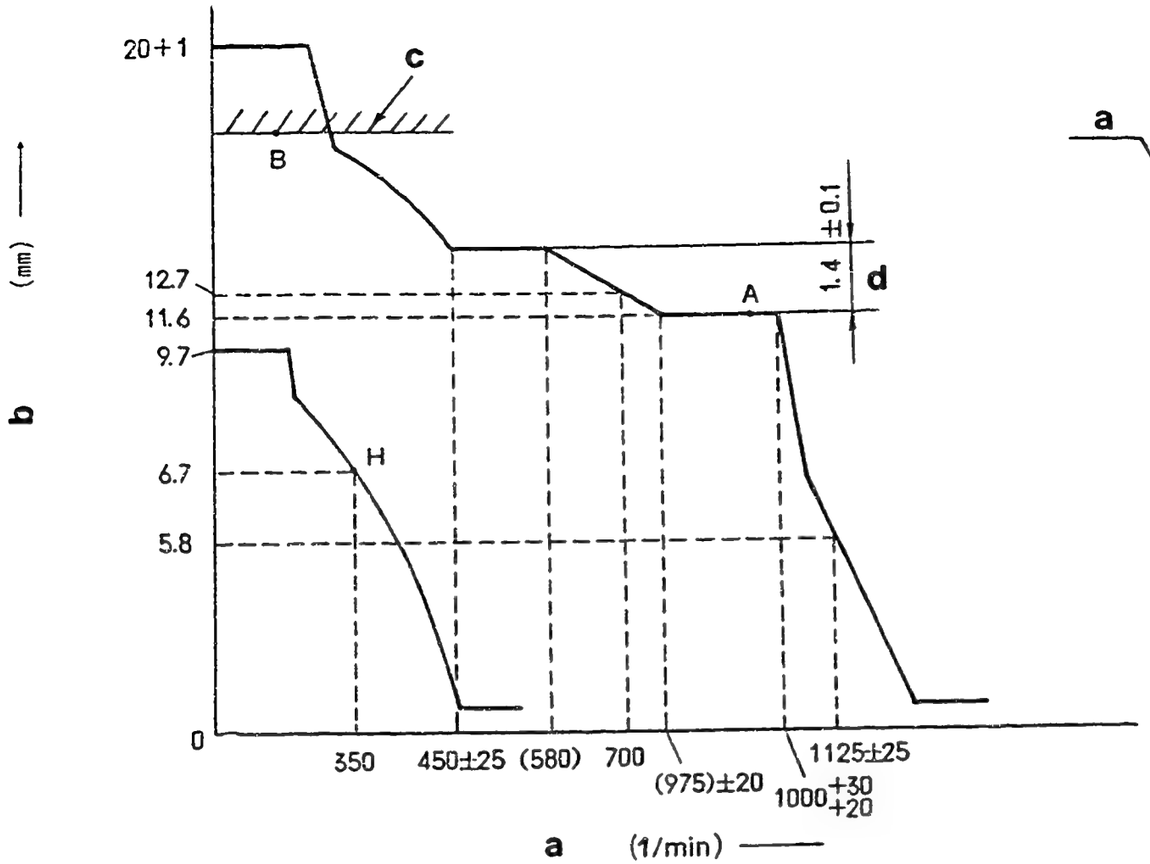
Continued (Test values)

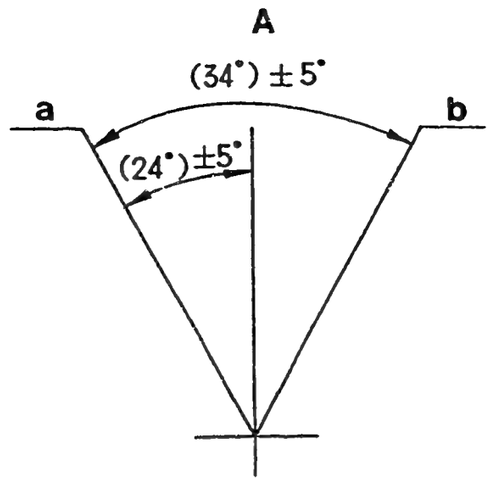
Injection Quantity :

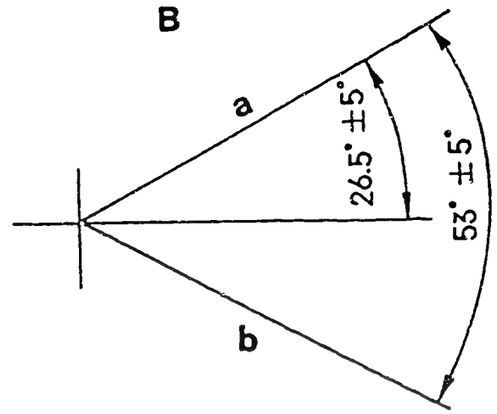
Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	11.6	1000	289.0 ± 5.0	-	Rack	Basic Each cylinder
H	approx. 6.7	350	39.3 ± 5.0	± 10	Rack	
A	11.6	1000	289.0 ± 5.0	-	Lever	Basic
B	approx. 15	100	358.5 ± 10.0	-	Lever	Control rack limit

Timing Advance Specification :

Pump Speed (rpm)						
Advance Angle (deg)						







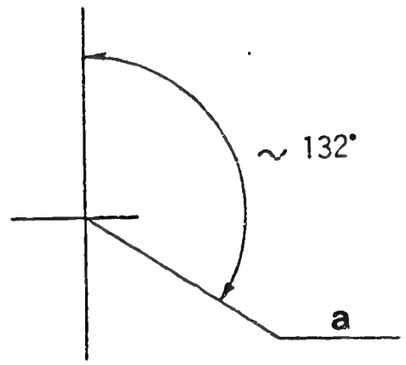


Figure 118

a = Pump speed
b = Control rack position
c = Control rack limit:
d = Difference in control rack position between 1000 rpm and 500 rpm

GOVERNOR ADJUSTMENT 106692-4741 2/4

Recommended speed droop adjustment screw position: 20

A = Speed Control Lever Angle
a = Full-speed
b = Idling

B = STOP LEVER ANGLE
a = Normal
b = Stop

TIMING SETTING

At No. 1 plunger's beginning of injection.

a = Gear coupling's aligning mark position (on key groove)

■ Note

- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

		Pump Speed (rpm)	Rack Position (mm)	Boost pressure kPa (mmHg)	Remarks
Full-load Adjustment (Temporary)		1200 700	11.6 11.6	-	• Adjust using screw (2) • Adjust using screw (1)
Torque Control Spring Adjustment	**1.st stroke**	450 ± 25	13.0	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
	2.st stroke	approx. 480 700 approx. 975±20	13.0 12.7 11.6	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: 1.4 ± 0.1 mm
Maximum-speed Adjustment		1000^{+30}_{+20} 1125 ± 25	11.6 5.8	-	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Boost Compensator System		-	-	-	• Fix the control lever • Adjust using screw (6) • Confirm the boost compensator stroke is: (mm)
Idling Adjustment 1. Idling Sub Spring	**H**	0 350	9.7 6.7	-	• Fix the control lever • Adjust using spring capsule (5) • Confirm
2. Control Lever	-	-	-	-	• Adjust using the control lever • Confirm
Full-load Adjustment		1000	11.6	-	• Confirm
Control Lever Angle Measurement		• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.			
Control Rack Limiter Adjustment		0	approx. 15	-	• Adjust using screw

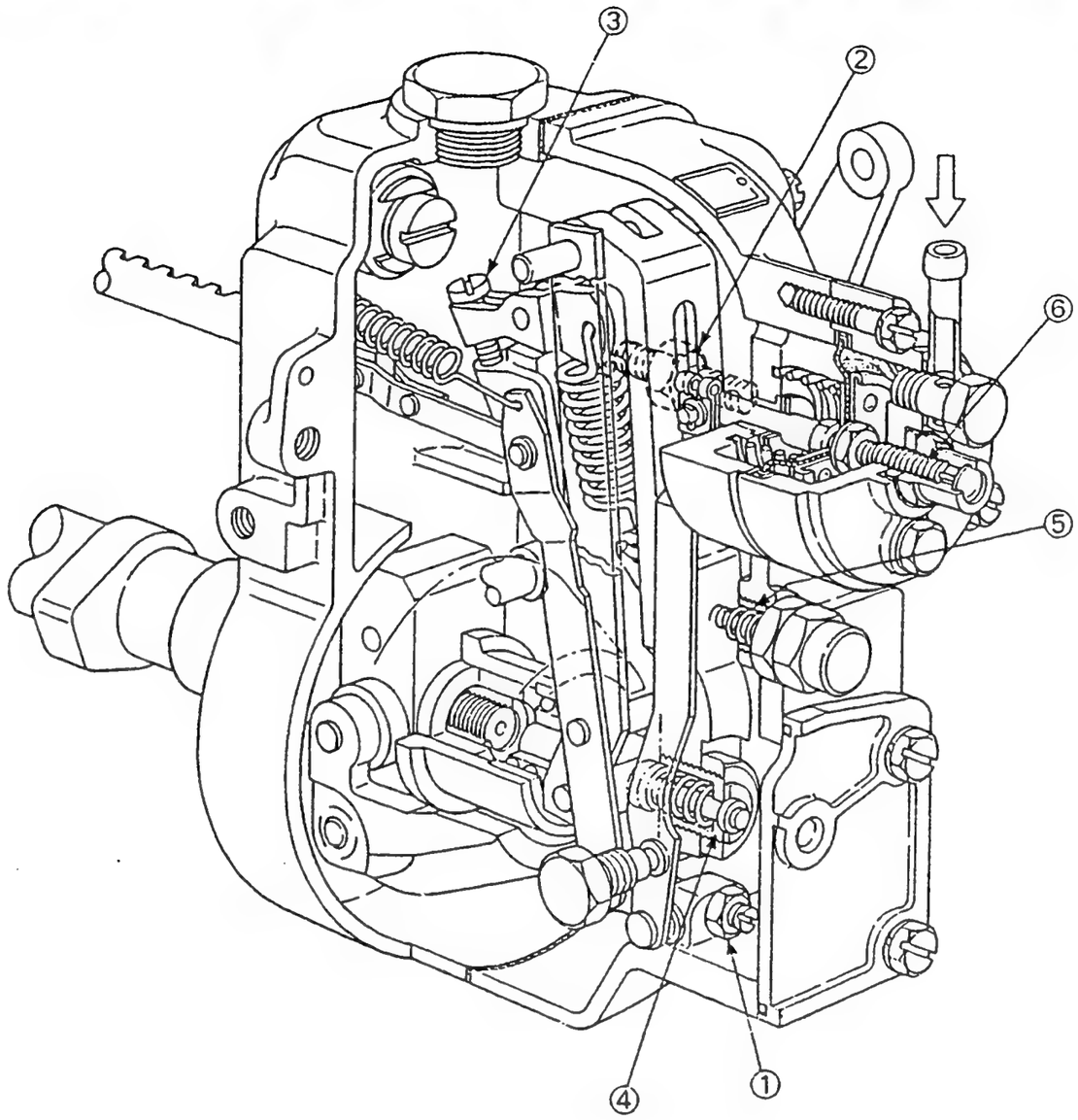


Figure 119
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule
6 = Screw

ZEXEL - TEST VALUES
Injection pumps

BOSCH No.	:	9 400 610 238 1/4
ZEXEL No.	:	106692-4752
Date	:	31.10.1992 [0]
Company	:	KOMATSU
Engine	:	S6D125 / 6151-71-1450

IP-Type number	:	106069-5420 / PE 6P
Governor type number	:	105407-3702 / EP/RSV

TEST PREREQUISITES

Test oil	:	ISO-4113
Test oil inlet temperature °C	:	40.00...45.00
Inlet pressure bar	:	1.6
Test nozzle holder combination	:	1 688 901 013
Opening pressure bar	:	175
Test pressure line		
Inner x Outer Dia - Length mm	:	3.00 x 8.00 x 600

PORT CLOSING

Prestroke mm	:	3.75 ± 0.05
Rod position mm	:	-
Port closing mark Cyl. No.	:	-
Cam sequence	:	1-5-3-6-2-4
Port closing mark Cyl. No.	:	-
Port closing difference °NW	:	0-60-120-180-240-300
Tolerance +- °C	:	0.50 (0.75)

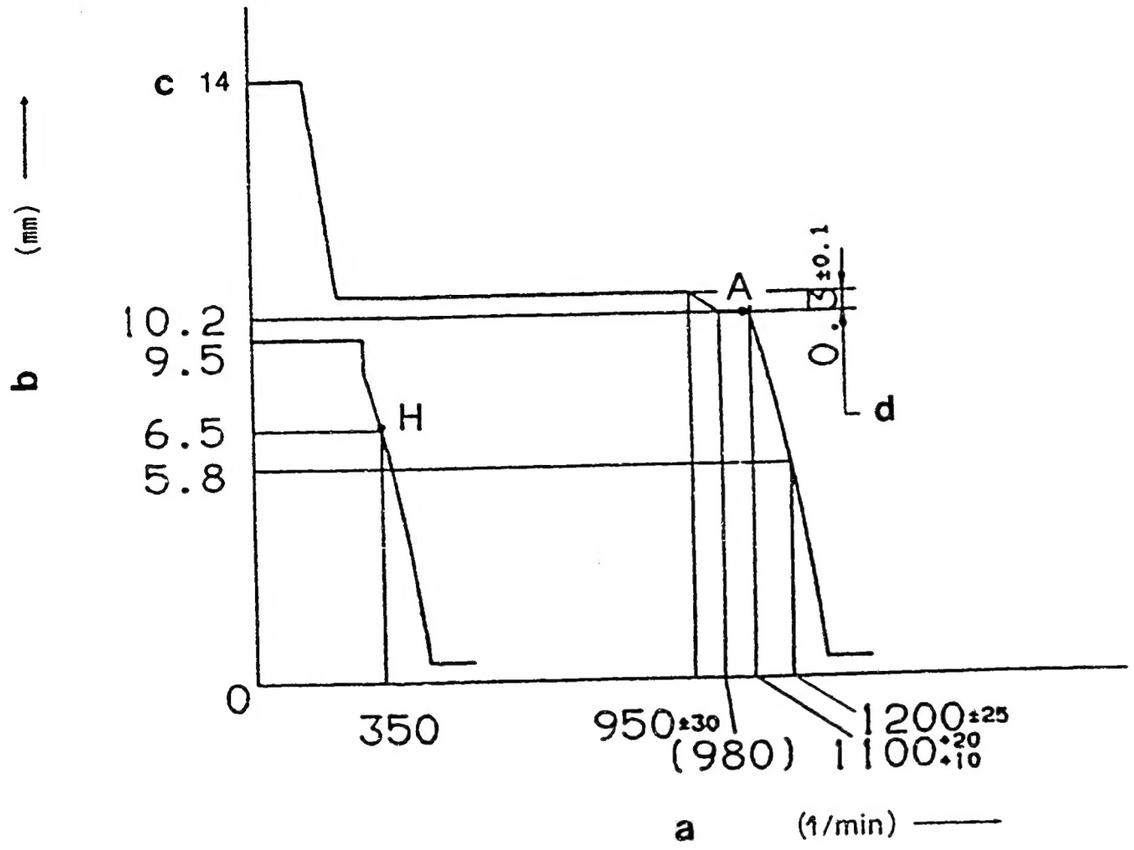
Continued (Test values)

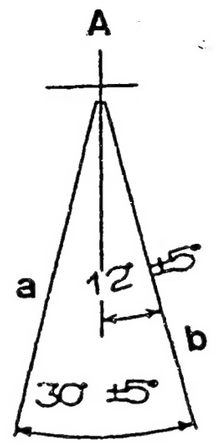
Injection Quantity :

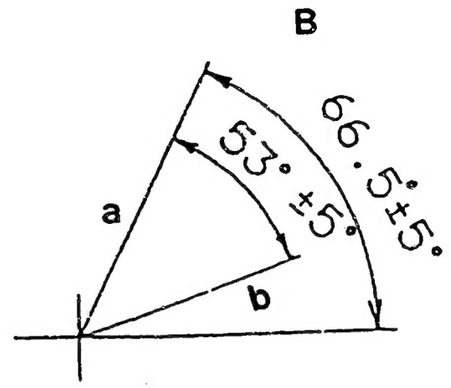
Adjusting Point	Rack Pos. (mm)	P. Speed (rpm)	Injection Q'ty (cm^3/1000 str.)	Difference (%)	Fixed	Remarks
A	10.2	1100	152.7 ± 2.0	± 3	Lever	Basic
H	approx. 6.5	350	12.0 ± 1.5	± 15	Rack	
A	10.2	1100	152.7 ± 2.0	-	Lever	Basic

Timing Advance Specification :

Pump Speed (rpm)						
Advance Angle (deg)						







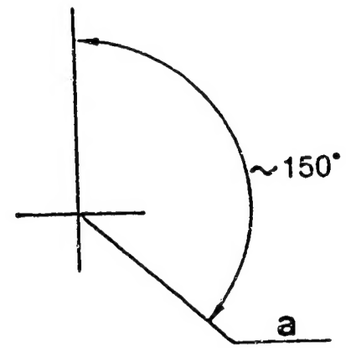


Figure 120

a = Pump speed
b = Control rack position
c = Above
d = Difference in control rack position between 1100 rpm and 700 rpm

GOVERNOR ADJUSTMENT 106692-4752 2/4

Recommended speed droop adjustment screw position: 13

A = Speed Control Lever Angle
a = Idling
b = Full-speed

B = STOP LEVER ANGLE
a = Normal
b = Stop

■ TIMING SETTING

At No. 1 plunger's beginning of injection.

a = Coupling key groove position

■ Note
- Before adjustment, remove the idling sub spring.
- Move the control lever fully in the stop direction, and set the minimum-speed stopper bolt so that the control rack position is 0.5 - 1.0 mm.

■ ADJUSTMENT

		Pump Speed (rpm)	Rack Position (mm)	Boost pressure kPa (mmHg)	Remarks
Full-load Adjustment (Temporary)		1300 700	10.2 10.2	-	• Adjust using screw (2) • Adjust using screw (1)
Torque Control Spring Adjustment	**1.st stroke**	approx. 850 950 ± 30 approx. 980	10.5 10.5 10.2	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: 0.3 ± 0.1 mm
	2.st stroke	-	-	-	• Adjust using spring capsule (4) • Confirm • Confirm the torque control stroke is: (mm)
Maximum-speed Adjustment		1100+20 +10 1200 ± 25	10.2 5.8	-	• Fix the control lever • Confirm speed droop - adjust using screw (3) • Confirm
Boost Compensator System		-	-	-	• Fix the control lever • Adjust using screw (6) • Confirm the boost compensator stroke is: (mm)
Idling Adjustment 1. Idling Sub Spring	**H**	0 350	9.5 6.5	-	• Fix the control lever • Adjust using spring capsule (5) • Confirm
2. Control Lever	-	-	-	-	• Adjust using the control lever
Full-load Adjustment		1100	10.2	-	• Confirm
Control Lever Angle Measurement		• Measure the control lever angle at the "idling" and "full" positions. • When the control lever is depressed toward the "full" position, replace the shifter's shim with a thicker one. • When the control lever is depressed toward the "idling" position, replace the shifter's shim with a thinner one.			
Control Rack Limiter Adjustment		-	-	-	• Adjust using screw

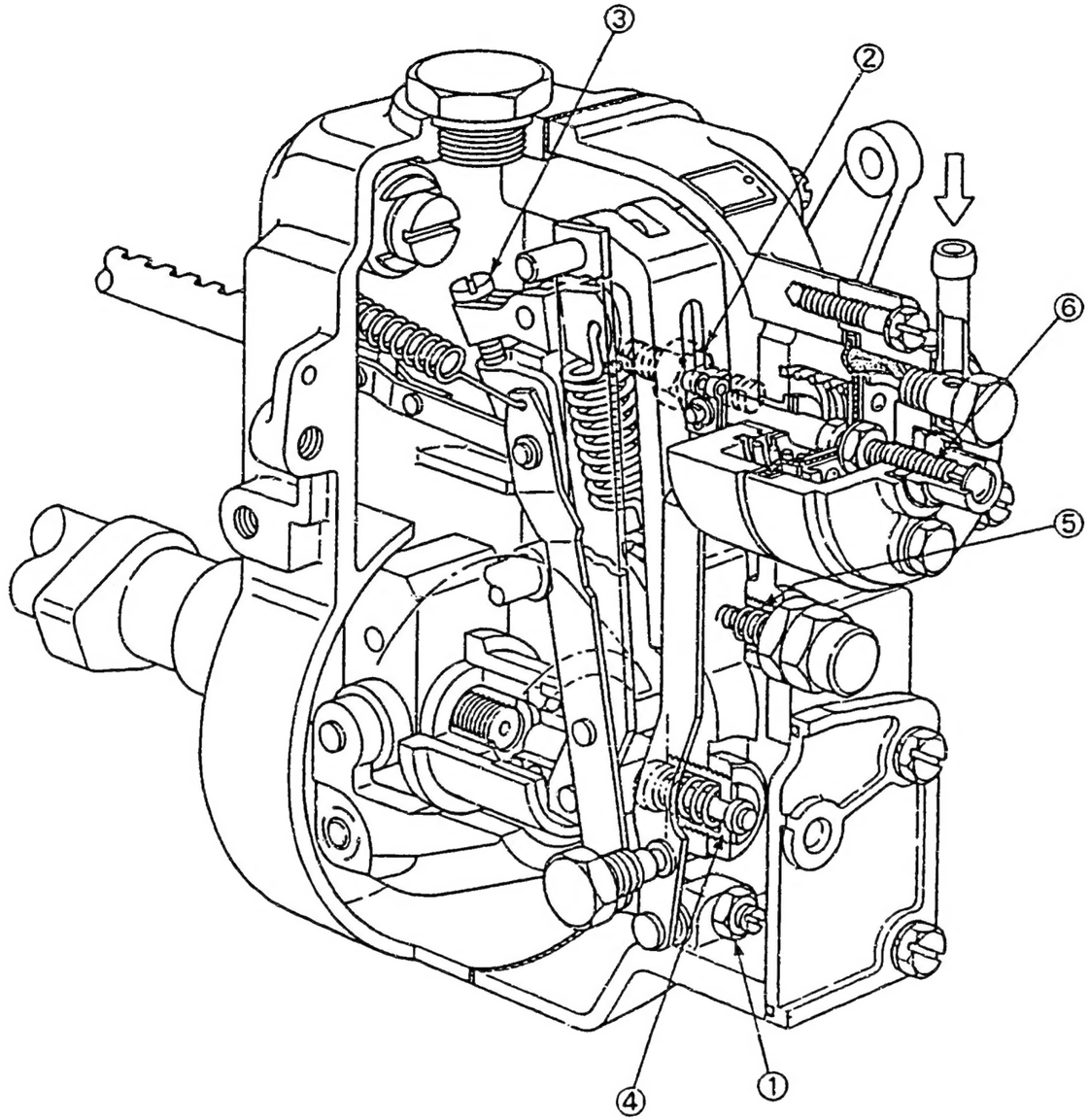


Figure 121
1 = Screw
2 = Screw
3 = Screw
4 = Spring capsule
5 = Spring capsule
6 = Screw